GA FE CONTROL

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FAGE 73

Strea lined Production:

True Builder Tools

True lexible Output

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Standard Methods for

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TEAde News of the WORKING WORLD

METHODS AND MACHINES FOR PRODUCTION

JANUARY, 1945

TOOL ENGINEER

Official Publication of American Society of Tool Engineers







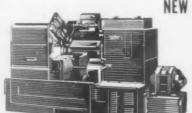




THE CHALLENGE OF '45

THERE is a sound basis for the belief that, with unflagging production efforts backing up our armed forces this can be the year of decision in Europe . . . possibly in the Pacific as well.

That is the challenge of 1945, to every man and woman in every job in every plant, in every town and city of America.



NEW BRITAIN-GRIDLEY MACHINE DIVISION

THE NEW BRITAIN MACHINE COMPANY

NEW BRITAIN • CONNECTICUT

Builders of Multiple Spindle Automatic Screw and Chucking Machines



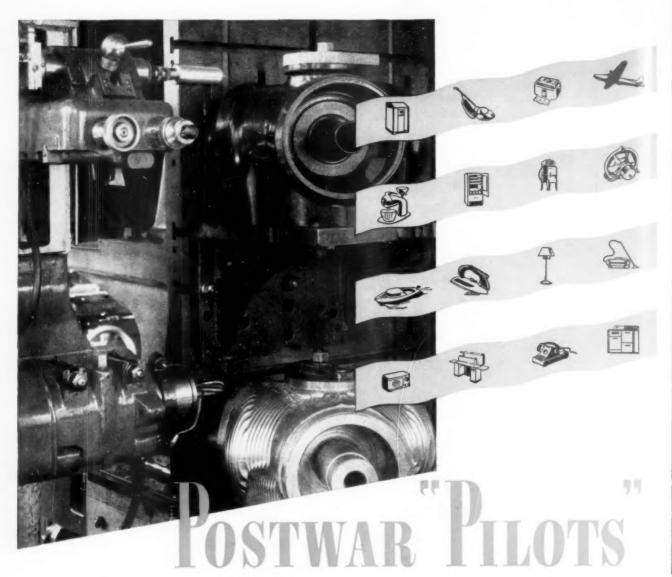












from the Machine with a "Brain"

This is the giant Keller—a machine whose mechanical "brain" and unerring touch are doing yeoman service in turning out vital war equipment. And it assumes an important new role as industry prepares for reconversion to civilian production.

To engineers and designers of postwar products it is proving invaluable in building pilot models and other experimental parts. New models — new inventions — can be developed for testing without expensive tooling and delay, without costly dies.

A wooden or plaster model or a plain template can be used to generate a model component out of a solid billet or rough squared forging. The Keller's tracer follows the most intricate pattern . . . its cutters reproduce this identically in two or three dimensions. It works by itself . . . does its own "thinking" . . . maintains its own accuracy.

When assembled, these parts may form a purely experimental model . . . more than likely it will be a "pilot" model ready to lead the way down the production assembly line. The Pratt & Whitney Keller is one more example of a machine that needs no conversion . . . that gives basic accuracy for mass production day in and day out, war or peace.



PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1 . CONNECTICUT

and definitely BETTER



DIAL INDICATOR

BETTER because:

Newest addition to STANDARD line, purposely designed to give you these gaging advantages:

- Perfect repeatability, whether workpiece is applied slowly or abruptly.
- * Hand registers instantaneously, without whip or waver. Red hand lessens fatigue; speeds inspection.
- Decimal dial graduations, as on blue print, eliminate errors in reading.
- * Reduced spindle tension, in some models up to 50%, and reduced internal friction give greater sensitivity.
- * Range less than one revolution. Avoids errors on parts more than a revolution oversize. (Range may be increased by removing stop collar).
- * Patented "Shockproof" design protects mechanism and is key to the *superior* accuracy of this Indicator.
- Upper half of face free of excess markings to facilitate easy reading.
- * All mounting dimensions AGD standards.

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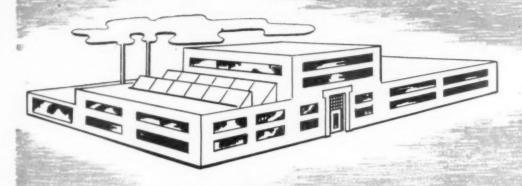
A Convincing Comparison of Precision



Rejections Red-Handed

Graph of impartial test by prominent gage user. STANDARD Decimatic repeatability checked against elaborate electric gage costing more than ten times as much. Note greatest difference in readings does not exceed 2/10 micron.

STANDARD GAGE CO., Inc., Poughkeepsie, N.Y.



WHEN YOU RECONVERT YOUR PLANT



LOOK

for

LOWER COST

HIGHER SPEED

GREATER ACCURACY

BETTER FINISH

Let a Detroit Broach engineer give you actual cost and production figures on your own job.



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Publisher's Letter

A FEW years ago a pioneer automobile manufacturer, who built his first car with his own hands, was listening to his executives wrangle over selection of a name for a new model car.

Argument had become acrimonious when the famous production genius broke in. "It doesn't matter so much what you call it," he said. "The important thing is what you put in the product."

As a corollary, we are about to give this publication a new title. After 10 years as "The Tool Engineer", this magazine will next month carry the name, "PRODUCTION Engineering & Management" ment".

There is no denying this title was selected with care. Selecting a name for any product depending upon public acceptance for its support is important.

But there was never a question as to what we would "put in the prod-

uct." It was not a new product we were naming. It was an old, accepted product to be re-named.

Announcement several months ago of this scheduled change in title aroused a brief flurry of speculation. Rumor had it that we were bring-ing out a "new" publication, that in re-naming "The Tool Engineer" we were planning to broaden its scope, dilute it with editorial material outside the interest of tool and produc-

Only one rumor was fact. That was the report that "PRODUC-TION Engineering & Management would be unchanged-except title.

Next month's issue is being assembled now by the same staff that produced this copy. The type of technical articles is identical. News departments are the same. Advertising is the same, and the number of pages-232-will be unchanged.

With this issue we cease to act as official publication for the American Society of Tool Engineers. Termination of contractual relations with ASTE will not change the overall appearance of "PRODUCTION

Engineering & Management." The only change in your magazine next month will be the replacement of ASTE chapter news, of strictly lo-cal interest, with even more technical news.

Our next issue will be delivered to all users of machinery and tools among the approximately 12,000 ASTE members qualified by the Society itself to receive the issues you have been reading.

The remainder of our nearly 20,000 circulation will, as always go to additional production engineers and manufacturing executives.

As a long-time member of ASTE, I am acutely conscious of the important role this Society can play in advancing the science of tool engineering. In the future, our Editors will report fully and accurately all ASTE activities vital to the metal-working industry, lending all worths. working industry, lending all worthy undertakings of the Society—as well as of others in this field-any assistance possible.

Roy 7. Bramson

Published the first Thursday of each month, by The Bramson Publishing ompany. Advertising, Editorial, and General offices at 2842 West Grand Scilerard, Detroit 2. Michigan. Telephone: MAdison 407.

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YOU

NEER

PRECISION-BUILT FOR PRECISION WORK

Precision work can be no more exact than the machine on which it is produced. This is why so many war plants, known the world over for the perfection of their products, rely upon precision-built South Bend Lathes for handling operations that demand machining to close tolerances.

While precision is measurable only in the finished work piece, it is the direct result of the lathe's design and construction. Unusually large spindle bearings, belt drive to spindle, hand-scraped bed ways, rigidity, and smooth operation are some of the features that make South Bend Lathes capable of the most exacting precision operations.

Today, as always, our entire factory is devoted exclusively to the production of South Bend Precision Lathes. No other product is made by us. There has been no lowering of quality standards because of wartime restrictions or shortages. The use of substitute materials is negligible, limited only to non-essential parts such as name plates, paint, etc. Improvements have been accelerated.

The performance records that these lathes are setting now on war production work forecast their value tomorrow when accuracy and production costs become critical competitive factors in post-war enterprise.

South Bend Engine Lathes and Toolroom Lathes are made in five sizes: 9", 10", 13", 141/2", and 16" swing. 1/2" and 1" collet capacity.









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The gage of today is NORBIDE (Norton Boron Carbide) because this hardest of man-made materials outwears conventional types of measuring devices 100 times and more. NORBIDE gages show exceptional resistance to abrasion and scratching; they will not pick up lint or become charged with particles of metal; they are inert to chemicals ordinarily employed where gages are used. NORBIDE blanks for plug, ring, snap and keyway gages and NORBIDE contact points for dial indicator gages can be obtained from your regular gage supplier.

For further information on NORBIDE gages write for booklet \$1100 to:

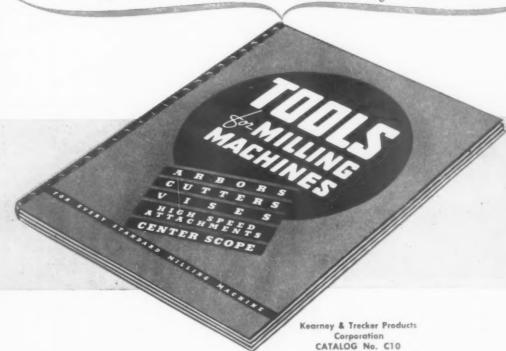
NORTON COMPANY — WORCESTER 6, MASS.

Hardest Material Made by Man

elt's New! elt's Complete! elt's 5 Catalogs in One!



Neatly Bound In 1 Quick, Easy Reference Book



This new Catalog No. C10 is the last word in convenience when selecting milling tools. It's actually 5 catalogs in one, giving complete technical data on Arbors, Cutters, Vises, and other accessories and equipment. 50 pages of useful information—spirally bound in one book that opens flat and smooth for quick, easy reading—it's the type of catalog every machine-shop man

wants to have around — handy! This bulletin would prove useful to your superintendent, master mechanic, tool and die men as well as your purchasing executives — send us your list on your company letterhead and we will be glad to mail copies to everyone interested in your organization. Would you tell us, please, the name of the magazine in which you saw this announcement.

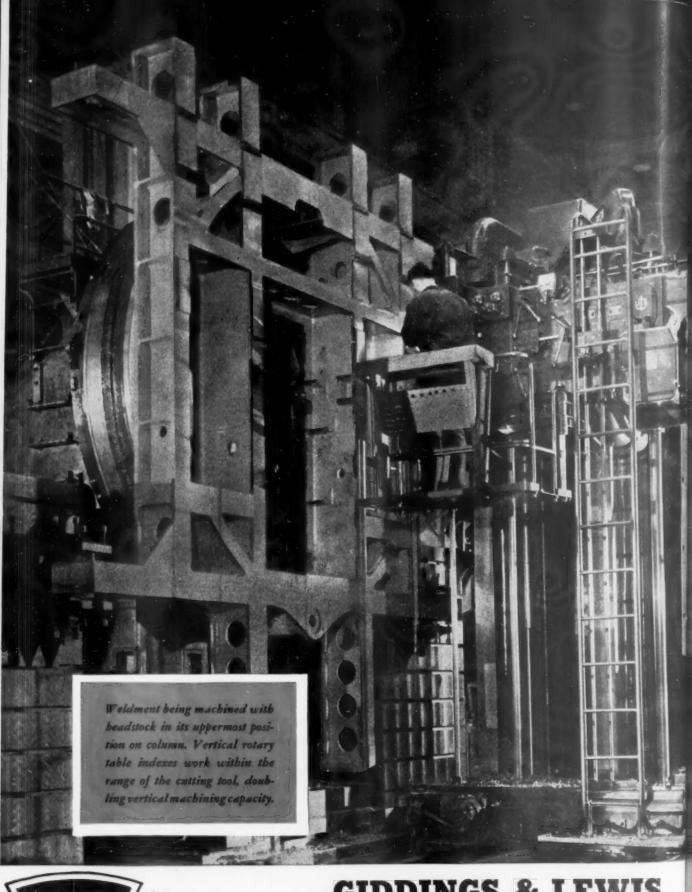
BUILDERS OF MILWAUKEE ROTARY HEAD MILLING
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Right: G. & L. Table Type Machine.

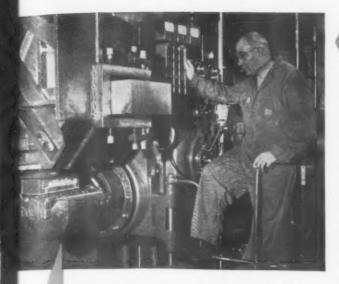
GIDDINGS & LEWIS

132 DOTY STREET



Right: G. & L. Floor Type Machine.





Slab milling ends of weldment. Work and holding fixture are easily indexed on the vertical rotary table into correct machining position.

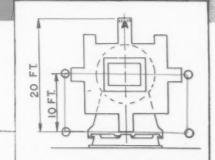
Power Driven Rotary Table Doubles Vertical Capacity of G.&L. Horizontal Boring Machine

Machining this 20-foot weldment is accomplished by using a vertical table with only 10 ft. center height and a horizontal boring machine having but 10 ft. vertical headstock travel. Work is indexed to bring the top down where it is accessible for milling and other operations. Both work rotation and tool rotation are possible. Using the power rotary table, work may be turned and faced with stationary tools much the same as on a vertical boring mill or on a lathe. Then, work can be milled, bored, drilled and tapped with tools in a rotating spindle in the conventional manner. Again work can be generated by rotating a formed tool in the boring mill spindle, while the work is turned by the rotary table.

An operator of a vertical boring mill working on a piece 20 ft. in diameter is at least 10 ft. away from the cutting tool. The operator of a floor-type horizontal boring machine, shown here, rides on a platform attached to the machine headstock and is at all times immediately adjacent to the cutting tool.

It is a simple matter to increase the range of your own horizontal by equipping it with a vertical rotary table. If you are confronted with similar machining problems, it will be profitable to call on our engineers for assistance. There is no obligation for this help.

MACHINING
A 20-FOOT
WELDMENT...
WITH 10-FOOT
HEADSTOCK TRAVEL



FACE MILL—ONE SET-UP 1ST OPERATION—FACE MILL

Red frame denotes maximum working range of horizontal boring machine spindle, which is the area covered by the vertical and horizontal travel of the headstock and column.

2ND OPERATION—INDEX 180°—FACE MILL Top portion "A" has now been brought down within working range of spindle.





Left: G. & L. Planer Type Machine.





Why it's CHEAPER QUICKER EASIER to use

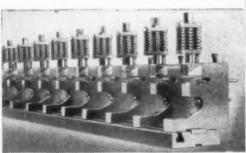
WALES HOLE PUNCHING UNITS



Wales Type "8" Units for punching sheet material in stamping presses



Wates Type "C" Units designed for punching angles and sheets on press brakes



Wales Type "E" Units to punch extruded shapes and channels on press brakes Wales Plate Set System punches holes in sheets as close as 1/2" center-to-center in any direction



Wales Hole Punching Equipment has revolutionized hole punching practices by making available to the metal working industry such time-saving, money-saving features as:

Unusual time-consuming adjustments of conventional set-ups are eliminated

Punch and die held in perfect alignment by holder Each unit is independent and self-contained

Straight line, staggered or scattered patterns, punched with same units

Same group of units may be used interchangeably on press brakes and stamping presses

Nothing attached to press ram

Individual units may be instantly removed or reset
Punches may be interchanged without disturbing
set-up

Die setting and press "down-time" reduced to minutes

Same units may be used and reused in unlimited patterns

By combining these exclusive and patented features into Wales Hole Punching Units, die making time is reduced to a quick assembly operation.

In keeping with the progressive Wales-Strippit policy, "There's Always Something New in the Wales Line," new hole punching equipment is continually being introduced to the metal working industry.

To punch it quicker, at less cost, write for Catalog TODAY.

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(Between Buffalo and Niagara Falls)

GEORGE F. WALES, President

Specialists in Punching and Notching Equipment

Can Help You Be Ready

for the

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RECONVERSION

THE RUSH FOR NEW TOOLS......

THE RUSH FOR NEW MARKETS

THE RUSH FOR NEW PRODUCTS...

When you get the "green light" for peacetime production you'll need action . . . fast! Tools and equipment to bring your product to market ahead of competition will be in heavy demand by every manufacturer.

There's a logical first step you should take now to assure yourself of getting the tools you know you'll need when the war job is done. Without in any way disrupting today's production for war, you can make practical plans and take action now toward building new products ... new jobs ... and new markets for tomorrow.

Foresighted analysis of your tool requirements will enable you to "reserve" your needs . . . will enable your distributor to supply you quicker when the "Reconversion Rush" begins. Estimate your reconversion electric tool needs and order them now from your Thor distributor so he can protect you on "first-come, first-served" delivery.

To facilitate your planning, send for the free Thor Tool Estimate sheet that will help you analyze your requirements in terms of the jobs you'll need to do.

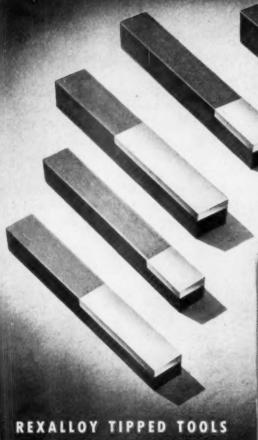


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Portable Electric Tools speed all jobs

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- ☐ Please mail me your new 28-page book, "REXALLOY CUTTING TOOLS".
- ☐ We would like to discuss the possible use of REXALLOY in our plant.

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EXALLOY Standard Tipped Tools for "Middle-Range" Machining Applications Cost Less, Cut More and Reduce "Down Time"

REXALLOY Standard Tipped Tools are highly economical and efficient for "Middle-Range" machining applications. Tipped with REXALLOY, the tough cast cutting alloy, these tools handle work in that important range between the upper limits of high speed steel and the lower limits of tungsten carbide. They cost less, of course, than solid cast cutting tool bits and are better able to stand excessive shock and unusual tool overhang. The high red-hardness of the REXALLOY tips permits vastly more speed, feed or depth of cut, better quality of finished product, and much less "down time" because of longer cutting life between grinds.

Your nearest Crucible Branch will gladly arrange for a REXALLOY Service Engineer to demonstrate REXALLOY Standard Tipped Tools, which are available from stock, competitively in your own plant. You stand to gain much by such a demonstration, so mail coupon today.

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Garvis POWER TOOLS

SALVAGE and SAVE
MEN, MONEY
and MATERIALS

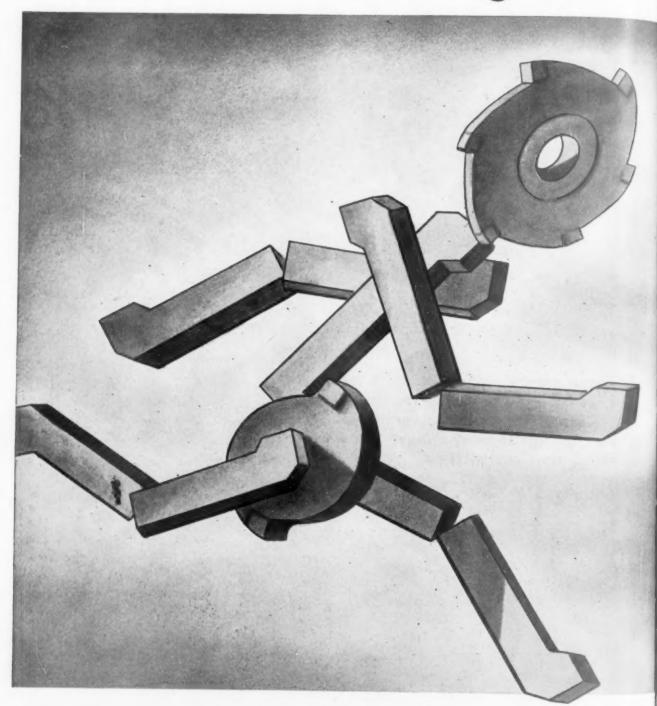
Send your ground rotary files back to us for regrinding. The saving is considerable—the service is fast. Regrind your rotary files and avoid shortages of these valuable, time-saving tools.



THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS . FLEXIBLE SHAFT MACHINES . GROUND ROTARY FILES

Cast Tool Bodies Bring Faster



The Cooper-Bessemer

CORPORATION

Cutting to 350 War Plants...

TOOL SHANKS, MILLING CUTTERS, AND FORMING TOOLS, ENGI-NEERED IN MEEHANITE BY COOPER-BESSEMER, REPLACE STEEL AND GIVE BETTER PERFORMANCE AT LOWER COST.

Here is another example of how Cooper-Bessemer's foundries have used the superior qualities of Meehanite metal to enable war industries to replace critically needed steel, and at the same time to save precious time and money.

Soon after the beginning of the war it became almost impossible to obtain the steel needed for tool shanks, milling cutters, forming tools and other carbide-tipped cutting tools. In its own machine shops Cooper-Bessemer found the answer to this shortage. For several years the company had been casting, grinding and tipping its own tool shanks of Meehanite. Why not make them available to others? A broad line of standard shapes and sizes of Meehanite shanks was developed and offered to companies equipped to tip their own tools.

In the first year, more than 800 tons of Meehanite tool shanks were used in 200 war plants, and their advantages have since brought them into regular use in all parts of the country. In addition Meehanite proved especially suited to milling cutters,

forming tools and other special shapes, and is now used extensively in recently developed high speed milling operations.

These Cooper-Bessemer tool bodies have several advantages over cast and forged steel:

- Greater damping capacity, which reduces tool chatter.
- Easier machinability, which cuts machining time in half. Meehanite tools are cast to any shape and require less machining to start with.
- A coefficient of expansion which is closer to that of tungsten carbide than steel.

- Faster heat dissipation which permits faster cutting and longer tool life.
- Meehanite tools do not load up the grinding wheel as rapidly.

Results of studies, corroborating these facts are shown in the attached table.

In more and more fields the ingenuity and knowhow of the Cooper-Bessemer foundries, exemplified in this development, and the unusual qualities of Meehanite are making it possible for manufacturers to build better with castings.

Today, other than tool shanks, milling cutters and forming tools our foundries are busy—sold out "for the duration." But when war needs are satisfied, we shall be prepared to work with industry widely, to help develop other innovations and improvements just as timely as these Meehanite cutting tools are today. Now, or at any time convenient to you, Cooper-Bessemer engineers and metallurgists will be glad to discuss the advantages of modern casting practice in Meehanite.

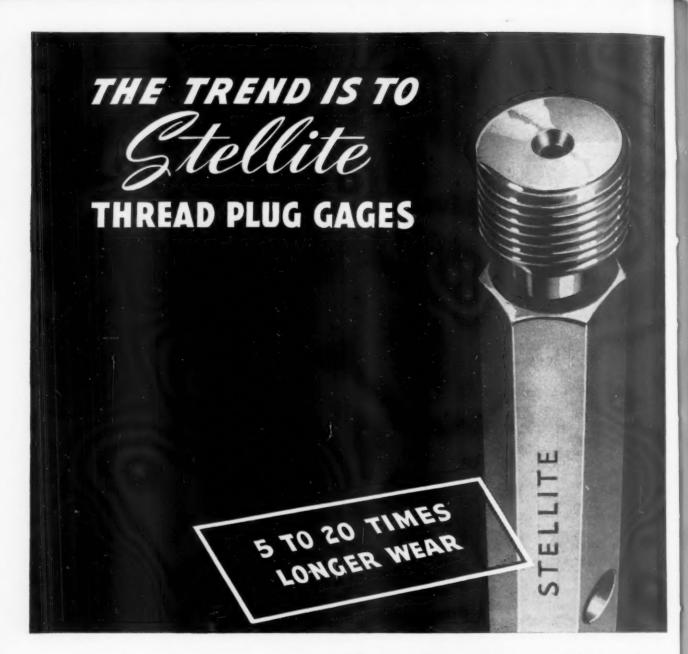
THESE FIGURES SHOW WHY MEEHANITE TOOL SHANKS ARE BETTER

MATERIAL	Forged Steel	Cast Steel	Gray Iron	Meehanite
SPECIFIC GRAVITY	. 7.9	7.6	7.0	7.48
ENSIBLE STRENGTH P.S.	72.000	65,000	30.000	50.000
TORTIONAL 15.000 P.S.I.	. 7.0	8.5	14.0	14.0
MACHINABILITY (DALCHER) CUTTING TOOL PRESSURE EXERT ED IN LBS		64.	41.	38.
MACHINABILITY (By Test) POUNDS REMOVED	170	170	170	170
HOURS REQUIRED	. 23	19.5	13.83	10.53

Meehanite Foundries

MT. VERNON, OHIO, DEPT. C.

GROVE CITY, PENNA. DEPT. F.



ALL STANDARD SIZES from No. 5 (.125") to 1.5" —Specials to 15"



THE increasingly large percentage of orders which we are daily receiving for thread plug gages made of Stellite indicates a marked preference for this longer-lasting alloy by those who use gages for the inspection of mass production parts.

Because of its demonstrated ability to give 5 to 20 times the wear of the best steel gages, many plants are now in process of changing over to the use of Stellite gages exclusively.

If you have a job that is tough on gages, give Cadillac STELLITE Gages a try! Keep tab on their length of service, as compared with the best results you have ever obtained with steel gages, and you will have definite proof that on quality inspection jobs Stellite gages will reduce your gaging costs to a fraction of what they have been heretofore.

• Write for Literature •

CADILLAC GAGE COMPANY

20316 HOOVER RD.

DETROIT 5, MICH.



 Geared to the precision demands of war, Chicago Wheels have been a potent force in smashing bottlenecks -cutting down rejects-speeding production to an all-

Constantly tested, constantly improved—Chicago Wheels produce finishes so perfect they pass exacting surface analyzer tests, so accurate they can be measured in micro inches.

Production of civilian goods will demand the same precision finishing methods.

Keep pace with Chicagos, the Wheels of Progress!

CHICAGO WHEEL & MFG. CO.

Half a Century of Specialization has Established our Reputation as the Small Wheel People of the Abrasive Industry

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CHICAGO GRINDING WHEELS

Anything up to 3¹¹ in diameter in various grains and bonds, including FV, the sensational new bond with a pedigree.

CHICAGO MOUNTED WHEELS

Shapes and abrasive formulas to take care of every job of internal or external finishing.

TRY ONE FREE!

So you'll know what they can do, we will send a test wheel. Tell us material you'd like to finish and size wheel required.

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Mounted Wheels.	Send Test Wheel. Size	
Name		

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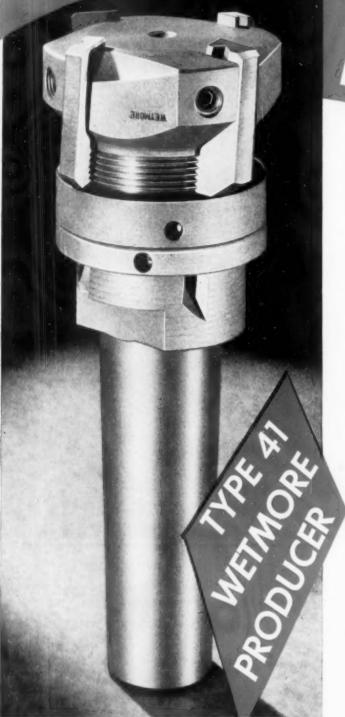
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THIS WETMORE PRODUCER IS A RUGGED TOOL



removes
more
stockfaster,
better...

...and is adjustable for wear

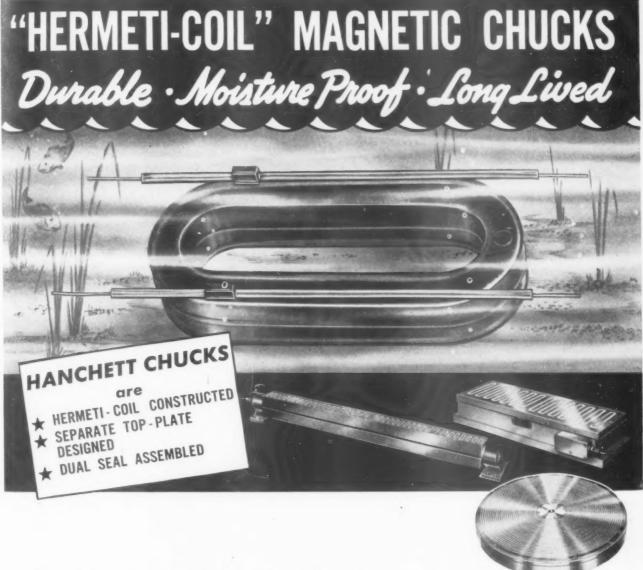
Send for our New Tool Guide—it is full of data, information and specifications...Free to executives and engineers.

Send for the New REAM-MOR blade bulletin for complete details.

WETMORE REAMER CO.

409 North 27th Street, Milwaukee 8, Wis.





Hanchett scores again. The new "Hermeti-Coil"* Magnetic Chucks are absolutely impervious to moisture. Each electric coil is hermetically sealed in a plastic case—an exclusive Hanchett feature.

Your magnetic chuck is only as good as its coil. Hanchett engineers have added almost unlimited production hours to magnetic chuck performance by their new method.

All styles and sizes of Hanchett Chucks (Rotary, Rectangular, Revolving) are made to these rigid standards. There's one to fit your needs.

See your nearest Hanchett dealer or Write for Bulletin 044-TA.

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- 1. Coil wound in Bakelite Varnish bath.
- 2. Thin layer of cotton tape applied.
- Placed in special vacuum chamber under pressure. Vacuum is relaxed and pressure applied.
- Coil removed and baked in electric oven for nine hours.
- When cool, coil is wrapped with Jayer of Varnished Cambric; dipped in Bakelite Varnish and baked.
- Coil sealed into plastic cover; assembly again evacuated. Vacuum relaxed with dry air and cover hermetically sealed.
- * Patent Applied For













IF IT'S A FLAT SURFACE-THERE'S A HANCHETT TO GRIND IT

HANCHETT MANUFACTURING CO. BIG RAPIDS, MICHIGAN U.S.A.

Co Wish Sincerely is to Pray Co take our proper place in a land at peace, A world where children play and Men may work Divorced from Fear, Where each may know the joy of a task well done And be rewarded for his share, Such is our Wish

MADISON, WISCONSIN



HERO ***

Soon he'll be home from the wars-triumphantly home ... to what?

The cold facts are these:

Nearly one-third of our fighting men are returning to "homes" that are without running water ... 35 per cent of the dwelling units in this country are without sanitary plumbing or bathing facilities of any kind . . . and American slums have bred the highest rate of juvenile crime in our history.

In short, there's still a war to be won here at home!

Our weapons are the mightiest on earth. Our manufacturing productivity is equal to half the world's total capacity . . . our basic economy and our currency are sound . . . and our faith in the American Ideal is stronger than ever before.

The time to start fighting that war is now. Delay could mean defeat, and the loss of all that our sons have fought and died for. Victory will mean a great new age of peace and prosperity, with jobs and security for all.

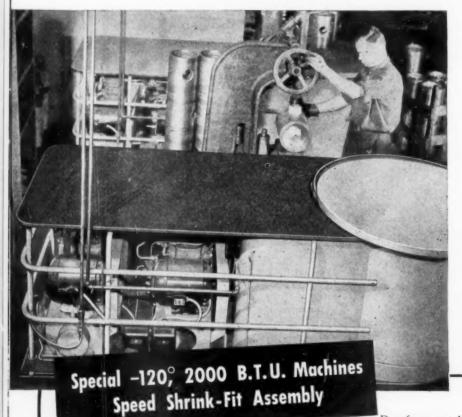
The engineers of the basic machine tool producers can help the men of government and of industry to win that victory . . . to plan now the reconversion of our tremendous wealth of resources, skills and machinery to all-out production for a better America.

One of these engineers is a Bryant man. We urge you to call him in today.



BRYANT CHUCKING GRINDER COMPANY

250% Increase in Piston Production with The Difference of the Production of the Pro



Industrial Chilling Machines

After trying three methods of inserting bronze wrist pin bushings in cast-iron and aluminum Diesel pistons, this manufacturer solved his problem with two special Deepfreeze Industrial Chilling Machines. The first method was to anchor bushings in pistons with locking screws. Next, shrink-fit was tried using dry ice, but this proved unsatisfactory because only .002" shrink was obtained The third method, using liquid air, was also unsatisfactory because production was slow and cost high. Now, after installing two Deepfreeze machines, each capable of removing 2,000 B.T.U.'s per hour, production has increased 250% and cost has been reduced considerably.

Here's How It Was Done with Deepfreeze

The bronze bushings, .005" over size, are immersed for three hours at -120° F. in the Deepfreeze machines. The bushings are shrunk so that only slight pressure with an arbor press is required for insertion in the piston. A special cradle fixture with a vertical pin serves the dual purpose of lining up the piston pin bore with the spindle of the arbor press and also as a stop for the bushing to locate it in the piston.

Deepfreeze Saves Labor and Production Costs

The best possible former production was 200 bushings assembled in 20 hours. Now, by the use of two Deepfreeze Industrial Chilling Machines 700 bushings are assembled in 20 hours. In addition, one operator turns out the work formerly requiring two. The cost of liquid air formerly used was \$1.00 per litre with 30 litres used per day. With

Deepfreeze machines there is only the relatively small cost of power required to operate four 1-hp. motors intermittently.

Learn How Cold Treating Can Save You Money

To determine the exact benefits that your company can derive from applying cold treating to your production, consult the Deepfreeze Engineering Service, which is conducted expressly for this purpose. Your inquiry will not obligate you in any way.

FREE...NEW COLD TREATING TEXTBOOK

A new 40-page booklet containing complete up-to-date information on cold treating, including new procedures, applications, performance data stories, etc., has just been published and will be sent to you upon request. Write for Bulletin No. I-4.



Only Motor Products can make a "DEEPFREEZE"

Deepfreeze

2311 DAVIS STREET, NORTH CHICAGO, ILLINO

TRADE MARK DEEPFREEZE REGISTERED UNITED STATES PATENT OFFIC

MOTOR PRODUCTS CORPORATION

NOW ON THE JOB PRODUCING ARMY TRUCK AXLE HOUSINGS ----

Baker

- yet this special machine is ready for quick conversion to PEACE-TIME PRODUCTION!

Specially-arranged 4-way
MULTIPLE-SPINDLE
DRILLING MACHINE
with Hydraulic Feed

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50%

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Operations handled by this special Baker 4-way driller are as follows:

•From the two standard 7½-A14 self-contained hydraulic feed units mounted to right and left ends on main horizontal bed:—

Multiple drill eight holes in each end of flange.

•From the vertical unit (which is a standard Baker simplified 30-HO vertical hydraulic feed machine):—

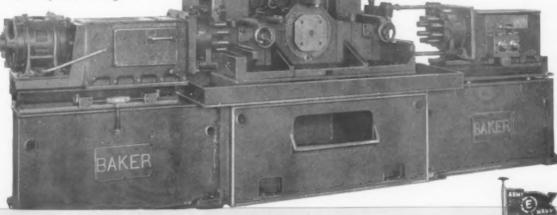
Drill one center pipe tap hole and six tapped holes in bosses; three bosses to each side of the center of axle housing. Illustration shows clearly the center spindle for the large size pipe tap hole with two spindles to each side of center spindle, and one spindle at each extreme end of other drilling operation.

★Vertical unit is mounted on a straddle frame of bridge construction, allowing for mounting another Baker 7½ A-14 self-contained hydraulic feed unit to rear, at right angles to two side units.

Rear horizontal unit furnished with an 11-spindle fixed center multiple head, permitting 10 holes to be drilled in banjo surface, and one hole to right of the banjo holes.

> NOTE that the illustration shows the electrical control panel mounted on side of machine, with frame open. The machine is fully automatic in its cycling, and is operated by a convenient push-button station.

> ALSO NOTE that the control panel (shown open) is high off the floor, as a protection against coolant dirt and dust. This is a feature now much stressed by the automotive industry in its designs and demands for post-war equipment.



Baker Brothers, Inc.

Toledo, 10, Ohio

MACHINES FOR DRILLING

BORING

TAPPING

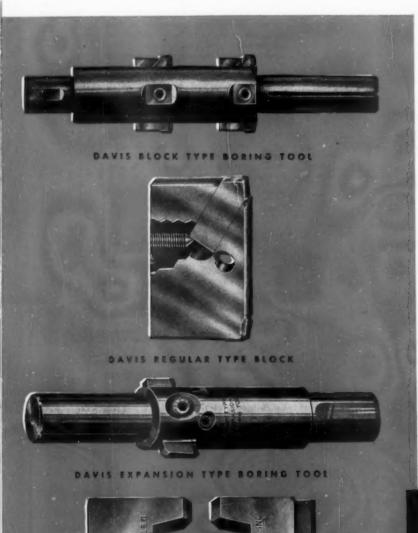
CONTOUR GRINDING

NOIS

ATION

Davis Boring Tools

SET NEW RECORDS FOR ACCURACY & ECONOMY!



DAVIS "L" TYPE BORING TOOL CUTTERS

Here Ane Why-

- Accuracy: Tools are precision built, assuring extremely accurate results.
- Interchangeability: Uniformity of design and structure of blocks and cutters allow a rapid and accurate change of set-up.
- Rugged Construction: The rigidity and simplicity of Davis construction produces stronger tools, allowing with safety increased speeds and feeds.
- Economical: Wide ranges of bores accomplished with a single tool. Cutters are all adjustable to compensate for wear and regrinding.
- Juniversal in Application: Wide range of work; all boring and reaming operations handled with unusual success in every industry.

Write Today for Illustrated, Descriptive Bulletins.

AVIS

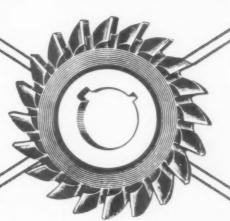
BORING TOOLS

DAVIS BORING TOOL DIV., Larkin Packer Company, Inc.

ST. LOUIS 14, U. S. A.

EASTERN CUTTER

RECUT OR



CONVERTED

STANDARD OF PERFECTION IN RECUTTING - RECONDITIONING OR CONVERTING

HIGH SPEED TOOLS

For Over Thirty Years

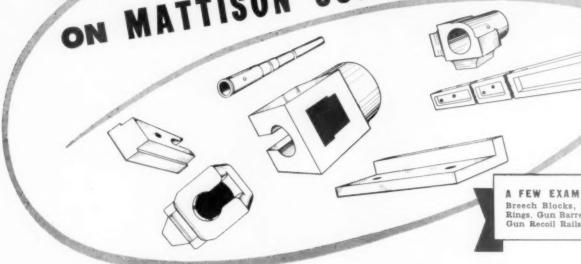
A COMPLETE RECONDITIONING SERVICE FOR TOOLS

CAN BE QUICKLY CONVERTE

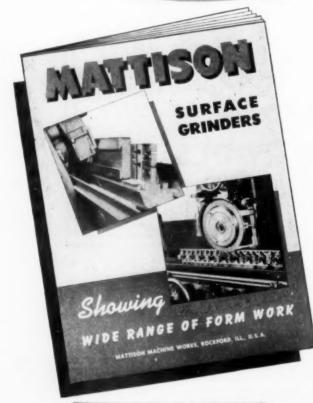
EASTERN CUTTER CORPORATION 30-32 Littleton Ave., Newark 7, N. J.

Chrome Plant MASTER CHROME SERVICE INC., 5709 Herman Ave., N. W., Cleveland, Ohio

WIDE RANGE OF FORM WORK NOW BEING GROUND ON MATTISON SURFACE GRINDERS



A FEW EXAMPLES; Breech Blocks, Breech Rings, Gun Barrels, and Gun Recoil Rails.



Through the use of special fixtures and contour dressing devices the above parts are all being ground on the Mattison High-Powered Precision Surface Grinder with a great saving of time and to extremely close limits of accuracy. These applications are important, not only from the standpoint of present production needs, but because they illustrate the unlimited capacity of Mattison Grinders over and above regular flat grinding. To you it opens up a new opportunity for grinding, a new opportunity for saving and a new opportunity for increasing production on work previously thought impossible to grind

Ask for new free book, showing these and other unusual jobs ground by means of special fixtures and dressing devices on the Mattison Grinder.

Send for this NEW BOOK

Dependable PRODUCTION and ACCURACY

BARBER-COLMAN

HOBS . HOBBING MACHINES . HOB SHARPENING MACHINES . MILLING CUTTERS

REAMERS . REAMER SHARPENING MACHINES . SPECIAL TOOLS



TYPES Automatic Hobbing Machine — For production of small precision gears up to 1" dia. x ½" face and 200 D.P.



No. 3 Standard Hobbing Machine — Capacity: 5" dia. x 7" face, 12 Pitch and finer. Built also in Precision Type.

THE YEAR 1945 should be an extremely interesting one from your point of view. You are going to be looking for new machines and new tools — machines and tools that will produce better, faster, and more accurately than any you have ever had before. We offer for your consideration the wide variety of products which are shown here. We urge you to investigate their outstanding qualities of durability, accuracy, and production capacity. We suggest our engineering and advisory service as an opportunity to gain money-saving, productimproving ideas from practical men with many years of experience.



HOBS — Ground and Unground, Standard and Special.

MILLING CUTTERS—
"Paraform"Design; Formed, Standard and Special.



REAMERS — Fluted, Inserted Blade, and "Pinwedge" Expansible Reamers.



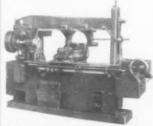
No. 3 Automatic Hob Sharpening Machine for hobs and formed cutters. Capacity up to 4" dia. x 4" face.



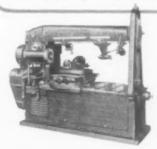
Write for these bulletins. Complete specifications and detailed description of each Barber-Colman product will be sent upon request. There will be no obligation.



COMBINATION Sharpening Machine
— Sharpens hobs, cutters and reamers, straight gashed up to 24" stroke, or maximum 30° helix with 8" stroke.



TYPE A Hobbing Machine — a rigid, accurate machine for general purpose or production hobbing. Capacity: 18" dia. x 12" face. 4 Pitch and finer,



TYPE T Taper Spline Hobbing Machine
— May be used also on general hobbing
work within its capacity. Spur and spiral
gears, straight and involute splines, etc.,
may be hobbed.



TYPE D Hobbing Machine — a heavy duty high production machine powered hydraulically. Capacity: 14" dia. x 14" face. 3 Pitch and finer.



No. 4 Automatic Hob Sharpening Machine for hobs and formed cutters. Capacity up to 12" dia, x 12" face.

Barber-Colman Company

GENERAL OFFICES AND PLANT 105 LOOMIS ST., ROCKFORD, ILLINOIS

Ingersoll

TIPPED



Ingersoll specializes in the manufacture of carbide tipped cutters for milling and boring operations. The wide variety of standard Ingersoll designs covers most applications. Consult Ingersoll regarding increased production through use of carbide tipped milling and boring tools.

Ingersoll carbide tipped blades are copper brazed in atmosphere controlled furnaces to insure a strong uniform bond between tip and shank. Send your inquiries for replacement blades to Ingersoll. Note the many types illustrated above.

Send for Engineering Specification Sheets describing standard inserted blade cutters. Any of the designs may be furnished with carbide tipped, high speed steel, or cast alloy blades.



SPAR CAP MILLING



FULL SIDE MILL







STAGGERED TOOTH SLOTTING



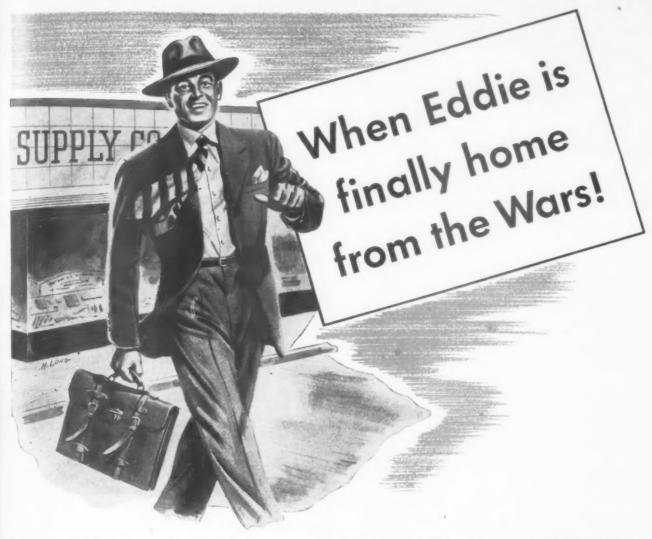
COMBINATION BORING



CYLINDER BORING



NEGATIVE AN SLOTTING



He'll be back on the Job for YOU!

A lot of people are going to be mighty happy when Eddie comes home. His family, of course ... and his boss ... and you.

Eddie used to work for your *Industrial Supply Distributor, and his former job is waiting for him. He's eager to get back into "civvies" and to start calling on you again, as he did in the good old days. You'll find him just as willing and helpful as ever.

Yes-it will be good to have all the "Eddie's" on

the job once more, showing you new products, helping you locate the hard-to-get items, pointing out new ways to cut costs and speed production. In the meantime your *Industrial Supply Distributor is worthy of all the cooperation you can give him. Short-handed and harassed, has he not been doing a pretty good job of taking care of your requirements during the present emergency?

Today-and tomorrow-you'll find it pays to

Telephone your



FIRST!



The CLEAN DE

COMPANY
1242 EAST 49* STREET
CLEVELAND

BUTHIBMAS ST. KEW YORK. U. B. PAT. OFF. AND FOREIGN COUNTRIES

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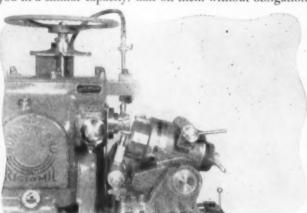
How Sundstrand Engineered Production Will . . .

Improve Your Milling Methods

One of these 3 methods will be most economical for your production milling job

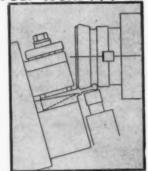
NO PRODUCTION problem is solved efficiently unless it is done with a minimum of equipment. When standard machines cannot be used without design changes, or, if obtaining production requires a battery of standard machines and operators, thereby raising unit costs, these Sundstrand production design methods will produce low unit cost milling.

The following three solutions to production milling problems illustrate the Sundstrand method and facilities for providing the most economical solution to production milling jobs. Our engineers will be glad to work with you in a similar capacity. Call on them without obligation.



1 Using Standard Rigidmils with Fixtures and Tooling to Suit Your Work . . .

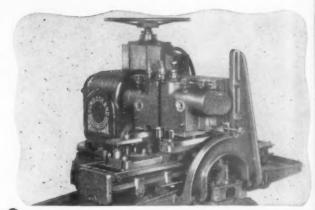
STANDARD No. 1 Hydraulic Feed Rigidmil provided with special work holding fixture arranged to hold one turbine blade part. Form milling the shank end is first completed on one side. The part is then indexed 180° and operation repeated on opposite side,



FREE Machine Data

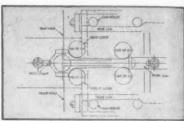
These free booklets cover machining and design details of Sundstrand Standard Milling Machines, Write for them today, Ask for Bulletins 832.





2 Rigidmils with Special Heads and Tooling . . .

MILLING taper and radius of both sides of an airplane connecting rod on a No. 1 Hydraulic Rigidmil equipped with a special work holding fixture and special twin spindle vertical heads. Each

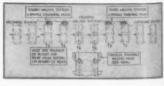


vertical heads. Each spindle is cam controlled for contour milling.



3 ENTIRELY SPECIAL MACHINES . . .

SPECIAL 6 station machine mills 6 blocks simultaneously. Ends, both sides of intermediate and



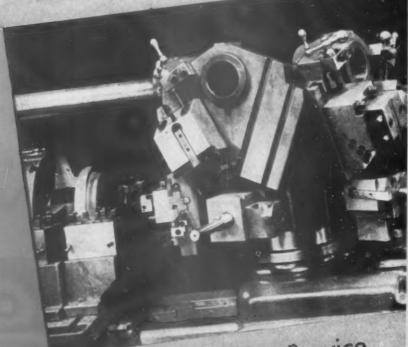
end bearings are machined with rough finish cuts taken on ends. Three of these machines replaced 18 other special machines.

SUNDSTRAND MACHINE TOOL CO.

Rigidmils * Fluid-Screw Rigidmils * Automatic Lathes * Hydraulic Equipment * Drilling and Centering Machines * Special Milling and Turning Machines

TOMORROW'S JOBS can be handled on TODAY'S MACHINES through

from PRE-WAR FLY-WHEELS to POST WAR DEMANDS



P&J Rebuilding Service

Owners of P&J equipment, interested in rebuilding their P&J Chucking Machines to restore original productivity and accuracy, are invited to investigate our ductivity and accuracy. Where desired, RE-TOOLING RE-BUILDING SERVICE. Where desired, Re-tooling can also be handled while machines are in our shop for rebuilding.



Back our Boys with BONDS and...

MORE BONDS!

CHECK GEARS

For Noise, tooth bearing AND NICKED TEETH There is no economy in assembling gears only to find out then that they are too noisy and will have to be replaced. You can always find out just how noisy gears are going to be by means of the Red Ring Sound Tester. Also, by the character of the gear sound made, you will be able to diagnose the reasons for the noise.

Sound from the gears running together in the sound chamber is amplified 50 times by the acoustical horn. All external sounds are excluded so that the sound tester may be used right out in the open shop—no special room is needed.

This machine is used also for checking tooth bearing under light loads and for discovering nicked teeth, especially in transmission, timing and engine gears—automotive and aircraft.

Under light brake loads gears can be tested at four speeds in both directions of rotation. The center disstance between spindles is adjusted by precision gage blocks. Standard machines accommodate gears up to 18" O. D.

WBITE FOR DESCRIPTIVE BULLETIN



RED RING PRODUCTS

5600 ST. JEAN . DETROIT 13, MICH.

SPECIALISTS ON SPUR AND HELICAL INVOLUTE GEAR PRACTICE

ORIGINATORS OF ROTARY SHAVING
AND ELLIPTOID TOOTH FORMS

CONTROL LEVER

HORN AND

UPPER SPINDLE

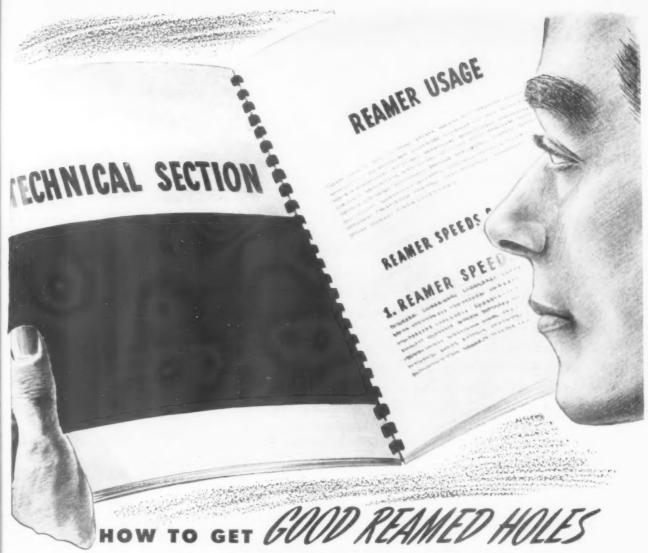
UPPER SPINDLE SLIDE ADJUSTING LEVER

SLIDE LOCKING

LOWER SPINDLE

GAGE BLOCK

UPPER SPINDLE



THIS FREE BOOK TELLS HOW

This valuable book will help you eliminate reaming trouble, increase cutting production and reduce tool costs. It answers such important questions as—

What are the best reamer speeds? What conditions contribute to chatter and out-of-round holes—and how can they be corrected? What are the best reamer feeds? What is the recommended practice on tool body diameters—on land widths—on reamers piloted through bushings?

It gives you valuable suggestions on sharpening and reconditioning carboloy-tipped reamers. Fully illustrated with photographs and diagrams that are easily understood.

This Technical Manual is included in the complete catalog on Staples Carboloy-Tipped Circular Cutting Tools. Your machine operators will find the data in this book of real practical help. Send for your copy today.

Staples Tool & Engineering Company Cincinnati 25, Dept. T.E. . . . Ohio

Staples CARBOLOY-TIPPED CIRCULAR CUTTING TOOLS

REAMERS - CORE DRILLS - SPOT FACERS - COUNTERBORES - END MILLS - SHELL END MILLS - ALSO A COMPLETE LINE OF CIRCULAR SPECIAL TOOLS

AUTHORIZED DISTRIBUTORS: L. A. Benson, Baltimore, Md.; The Cameron & Barkley Co., Charleston, S. C.—Branches: Jacksonville, Fla.; Tampa, Fla., Miami, Fla.; G. F. Cotter Supply Co., Houston, Tex.; Arthur A. Crafts Co., Inc., Boston, Mass.; J. E. Dilworth Co., Memphis, Tenn.; The John C. Eide Co., Minneapolis, Minn.; Empire Machinery & Supply Co., Norfolk, Va.; Fuchs Machinery & Supply Co., Ornaha, Neb.; General Carbides Co., Newark, N. J.; Harold W. Kimball Co., Waterville, Me.; Machinery Sales & Supply Co., Dallas, Tex.; Marshall Supply & Equipment Co., Tulsa, Okla.; The Mine and Smelter Supply Co., Denver, Colo.; Murray-Baker-Frederic, Inc., New Orleans, La.; R. C. Neal, Inc., Buffalo, N. Y.; Neal & Co., Erie, Pa.; A. N. Nelson, Inc., Brooklyn, N. Y.; Quina & Quinn, Birmingham, Als.; Sager-Spuck Supply Co., Inc., Albany, N. Y.; Screw Machine Supply Co., Chicago, Ill.; Sterling Supply Co., Detroit, Mich.; Strong. Carlisle & Hammond Co., Cleveland, O.; Syracuse Supply Co., Syracuse, Y.; White Supply Co., Waterbury, Conn.; Muskegon Hdw. & Supply Co., Muskegon, Mich.; El Paso Saw & Belting Supply Co., El Paso, Tex.; Mill and Factory Supply Co., Toledo, O.; W. S. Murrian Co., Knoxville, Tena.

The Sunnen Precision Honing Machine - with New Coolant Pump and Base -

GREATER HONING SPEED and ACCURACY

Typical Jobs



Aircraft Hydraulic Brake Cylinder. Honing 3 times faster than lapping — and gave a straighter hale.



Header Die Life of hand dies increased 3 to 9 line over lapping. Knock w pin breakage practicals eliminated.



Control Wire Bushing, Hole .187" diameter — held .187" diameter — held to .0002", stock removal



Aircraft Piston Pin. Sunner honing is twice as fast and gives a cleaner, belte gives a cl looking pin.





pensator Valve Seat. Hole is honed to .0002" limit



Aircraft Valve Tappet Roll er. Honed after grinding to give 100% bearing



honing eliminates distortion from assembling operation





Shaft Gears, Taper re-moved at a rate of 80-90



Roller Bearing Outer Race. Finish improved from 12 micro-inches to 2 micro-inches.





Carbureter Idler Valve Jet. Hole is honed after ream-ing for smooth action.



Shell Loading Die



Cast Iron Valve Stem Guide 1/2 10 one thousandth removed — 220 pieces per hour. Better finish and hour. Better straighter hole.



Moning gives straight round hole after rough reaming

With the addition of a new base that contains a pump for supplying honing fluid, the Sunnen Precision Honing Machine is setting new standards of accuracy. Honing is faster, too. The honing fluid carries away all cuttings, keeps the abrasive stone sharp, and cools the part being honed.

With the Sunnen Precision Honing Machine, accuracy is augranteed to be within .0001"— and has been held to .000025". A super-smooth finish can be produced. On certain types of metal, a finish of 2 to 3 micro inches can be obtained.

- Hones and finishes cylinders from .185" to 2.625" in diameter
- · Can be used in either ferrous or non-ferrous metals - plastics ceramics, etc.
- Does not require skilled labor
- No jigs or fixtures needed
- Economical to operate
- · Can be set up to operate in one minute

Write for a free bulletin giving details about this low-cost honing machine — or ask a Sunnen engineer to show you how it can be used on your jobs.

The coveted Army-Navy "E" waves over the Sunnen plant - evidence of the important part Sunnen equipment is playing in the

war effort.

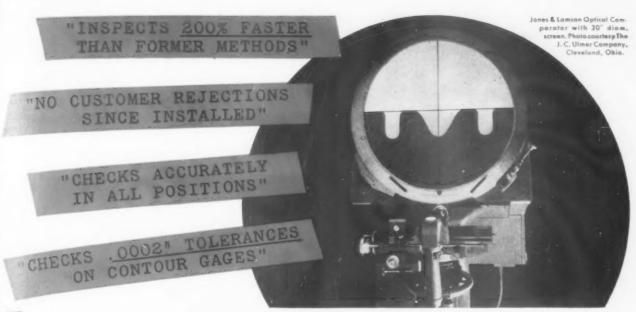


SUMMEN

SUNNEN PRODUCTS COMPANY, 7932 Manchester Avenue, St. Louis 17, Missouri

Canadian Factory: Chatham, Ontario

UNNEN



This, in brief, is what a manufacturer of precision tools and gauges has to say about his Jones & Lamson Optical Comparator. The record speaks for itself, but it is just one of hundreds of instances where the use of these Comparators has resulted in inspection economies, better products and satisfied customers.

Form tools, gauges and other products with complex or multiform contours can be checked and measured in all dimensions with the standard measuring attachments of Jones & Lamson Optical Comparators.

Or, the inspection of large quantities of duplicate parts can be made rapidly and accurately, by comparison with a master outline drawn upon the glass screen, on Comparators designed specifically for this purpose. There is a model for every job, and the results are beyond a shadow of a doubt.

For the method best suited to your own needs, consult a Jones & Lamson inspection engineer. There is one near you, and he is backed by an organization with over 20 years experience in optical inspection.



This book "Beyond a Shadow of a Doubt" will tell you more about our Optical Comparators and what they are doing.



JONES & LAMSON

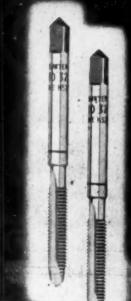
MACHINE COMPANY Springfield, Vermont, U.S.A.



Manufacturer of: Universal Turret Lathes • Fay Automatic Lathes • Automatic Double-End Milling and Centering Machines • Automatic Thread Grinders • Optical Comparators • Automatic Opening Threading Dies and Chasers.

EER

136,000 Tapped holes That's the Endurance Record



WINTER TAPS like These

> TAP TIPS Mumber 2 3JOH A PAT TOH OO DRY. USE PLENTY OF LUBRICANT

The story comes from a manufacturer in California. A run of 68,000 parts, tapped 10-32 with duplex head — or 136,000 tapped holes, with two WINTER Carbon Steel, Chip Driver Taps.

Stock tapped was 14-gauge thick, or a trifle heavier. Holes pierced, about .164". Lubrication: water soluble oil. Tapping speed, 800 RPM; 1000 pieces — or 2000 holes — tapped per hour.

As the customer declares: "The taps were in excellent condition after the run and are good for many more parts."

This customer has been using WINTER Taps for eighteen years ___ periodically tests nearly all other makes __ but sticks to WINTER Taps.

You, too, have your tapping jobs. Let WINTER Engineers recommend the RIGHT tap for your work.

inter Brothers



Wrentham, Massachusetts, U.S.A.
SAN FRANCISCO CALIFORNIA-CHICAGO ILLINOIS-DETROIT MICHIGAN

new



7/ 00

MODEL JA 50,000 R.P.M.

\$2975 in U.S.A.

NOTE:—Higher speeds at higher prices are available if supporting engineering data are submitted. Higher speeds are not recommended unless properly supervised.

Weight 12 ounces; Length 63/4 inches; Chuck Size 1/8 inch. Wheel Guard Removed for Better Illustration

Featherweight

AIR GRINDER

The Model in design both inside and outside. In design both inside and outside. In a little of fewer parts, and they are model Magnesium and Aluminum for the weight lightness. The standard mooth and true operation. It is in the speed, as before, is governed there are selected ball bearing that and there are selected ball bearing that and rear. The JA Featherweight is a distinct improvement over all models previously produced by Madison-Kipp, the originators of really high speed grinders.

The same low price, \$29.75 in U.S.A., remains. It is a post-war design for which materials have been released early. The pre-announcement output was geared to expected demand. Deliveries will be made out of stock as long as possible.

MADISON-KIPP

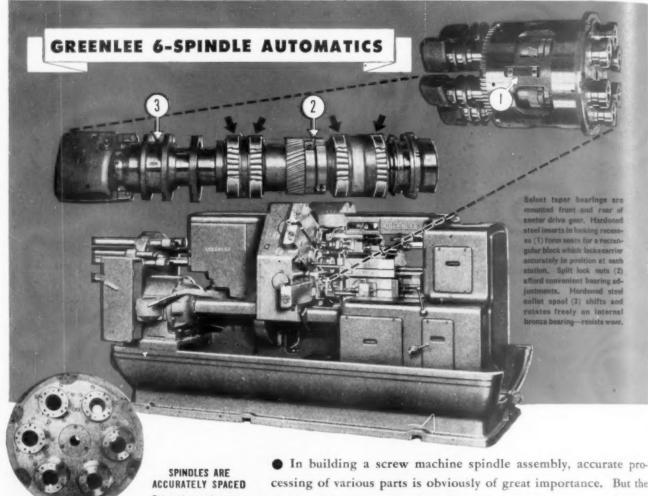
MADISON-KIPP CORPORATION, 209 Waubesa St., Madison 4, Wis., U. S. A.

Sole Agent in England: Wm. Coulthard & Co., Ltd., Carlisle

EER

HOW REFINEMENTS IN SPINDLE CONSTRUCTION

INSURE ACCURACY . EFFICIENT PERFORMANCE . LONG LIFE



Painstaking care is exercised to insure accurate spacing of spindles and to maintain precise relation between tools and work at

NOSE CAP HOLDS COLLET POSITIVELY

Nose-caps that hold collets positively, are quick and easy to remove. All six collets and pushers may be changed without indexing carrier.



COLLET PRINCIPLE INSURES ACCURATE FEED OUT

Collets of stationary type, are operated by action of sliding sleeve over the taper of collet. There is no endwise movement of collet and therefore none is transmitted to stock. Thus, greater accuracy in length of piece fed out to stock stop is assured.

• In building a screw machine spindle assembly, accurate processing of various parts is obviously of great importance. But the design and proper use of materials, in relation to wear and tear, holds also high priority in the construction of Greenlee Automatics.

The spindle carrier, for instance, is made from an alloy, heat-treated casting, ground to precision limits . . . has a heavy flange to take end thrust . . . adjusting blocks at rear to eliminate end play. There are provisions for easy accessibility. Pressure fed lubrication cascades downward reducing friction to a fraction.

Spindles are ground inside and out: Precision tapered bearings are spaced front and rear of center drive gear . . . are easy to adjust. These and other Greenlee refinements promote accuracy, production efficiency, long machine life. Write today for data on timesaving, cost-saving features.

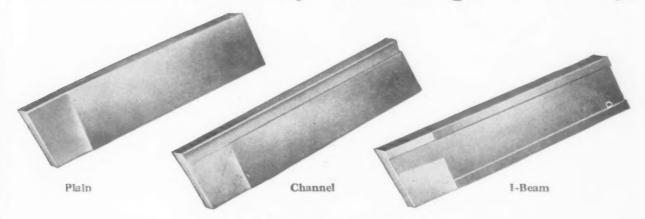
GREENLEE BROS. & CO., 1941 MASON AVE., ROCKFORD, ILL.



MULTIPLE-SPINOLE DRILLING, BORING, TAPPING MACHINES . AUTOMATIC SCREW MACHINES . AUTOMATIC TRANSFER PROCESSING MACHINES

USE HAYNES STELLITE 98M2 GROOVING TOOLS

For Greater Accuracy and Longer Tool Life



AVAILABLE IN 3 STYLES

in a range of thickness from 0.045 in. to 0.3125 in. in lengths from 3½ in. to 5 inches.

HAYNES STELLITE Grooving Tools can save you money by maintaining accuracy of grooving operations on cast iron, aluminum, brass, and bronze.

These tools assure maximum rigidity, maintain accurate width clearances, and allow the maximum number of regrinds per tool. The side lands are lapped to a smooth cutting edge, making the tools last longer. To resharpen these tools, it is necessary only to regrind the front clearance angle.

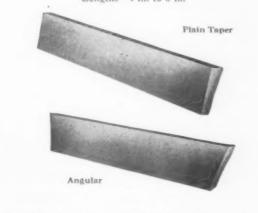
For more information on how you can use HAYNES STELLITE cobalt-base cutting tools to increase production and lower the cost per piece machined—not only for grooving work, but for such work as turning, facing, boring, and milling—write for the booklet "Operating Information on Haynes Stellite 98M2 Tools." Ask for Form 5350.

CUTOFF TOOLS

HAYNES STELLITE cutoff tools, available in 2 Styles—Plain Taper and Angular—are for cutoff operations on tubing or cylinders of cast iron, brass, bronze, aluminum, and many types of steel.

Thicknesses—3/22-in. up to 5/16-in.

Lengths-4 in. to 6 in.



BUY UNITED STATES WAR BONDS AND STAMPS



HAYNES STELLITE COMPANY

Unit of Union Carbide and Carbon Corporation

New York 17, N. Y. Kokomo, Ind.

Chicago-Cleveland-Detroit-Houston-Los Angeles-San Francisco-Tulsa

HIGH-PRODUCTION METAL-CUTTING TOOLS

"Haynes Stellite" is a registered trade-mar! of Haynes Stellite Company.

JANUARY, 1945

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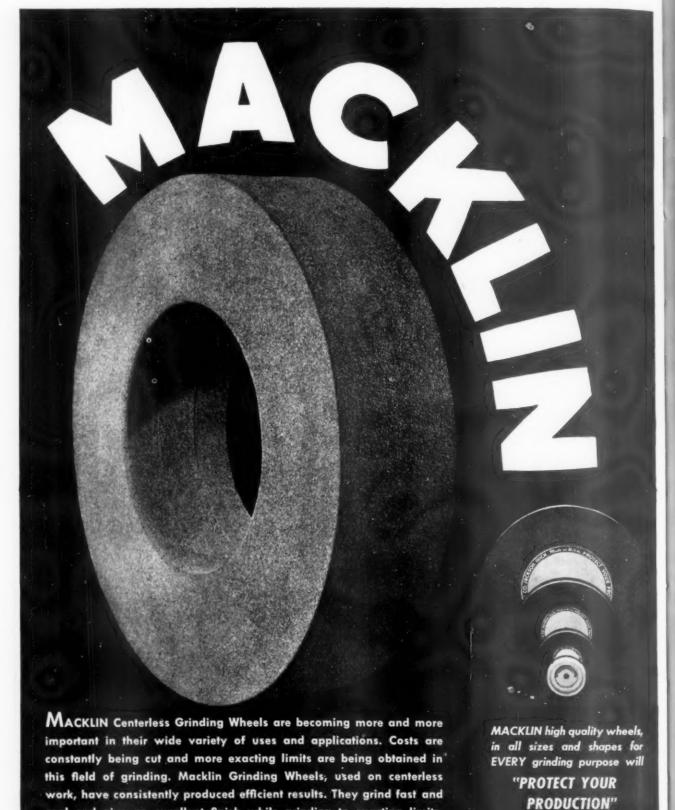
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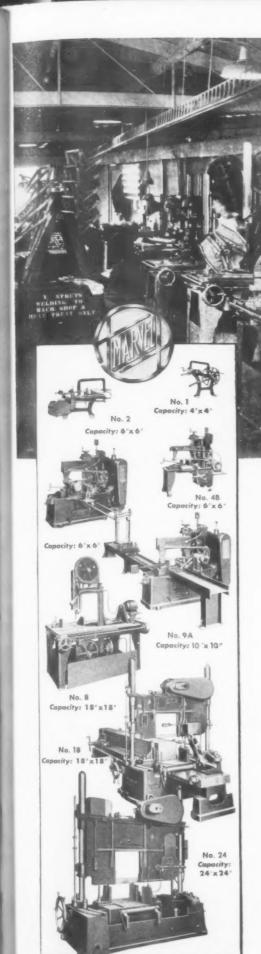
MACKLIN COMPANY

cool and give an excellent finish while grinding to exacting limits.

Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U.S.A.

Distributors in all principal cities

Sales Offices: — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia



MAKE ANGULAR CUTS ON AWKWARD WELDMENTS EASILY

Illustrated are six of the 13 MARVEL No. 8 Universal Metal Cutting Band Sawing Machines in the plant of the National Supply Company in Torrance, angles for airplane struts. The National Supply Company selected the No. 8 California. They are operated entirely by women, cutting tubing at various MARVEL Band Sawing Machines for this work because no other equipment is available to cut these airplane struts with ease, accuracy and economy. They are also using this saw in their tool room, for no matter how small and delicate or heavy and clumsy the job, the MARVEL No. 8 Band Saw will handle it with equal ease.

For production cutting of bar stock up to 10" x 10", they are using three No. 9A MARVEL Saws; which automatically measure, cut and feed up bars in sizes up to 10" diameter into accurate, equal lengths, similar to a screw machine, without the attention of an operator.

For real big sawing work, such as shipshaft breech blocks of guns and other heavy forgings, three No. 18 MARVEL Universal Roll Stroke Hack Saws are used. These giant saws have made possible the economy, speed and efficiency of the Hack Saw Method on cutting large work up to 18" x 18" and 24" x 24".

A "MARVEL metal Cutting specialist" is available to survey your work, to recommend the best solution to your cut-off problem and to furnish accurate cost and production data on your work. All without cost or obligation, of course. Write for full information.

BUY FROM YOUR LOCAL DISTRIBUTOR

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 W. BLOOMINGDALE AVE.

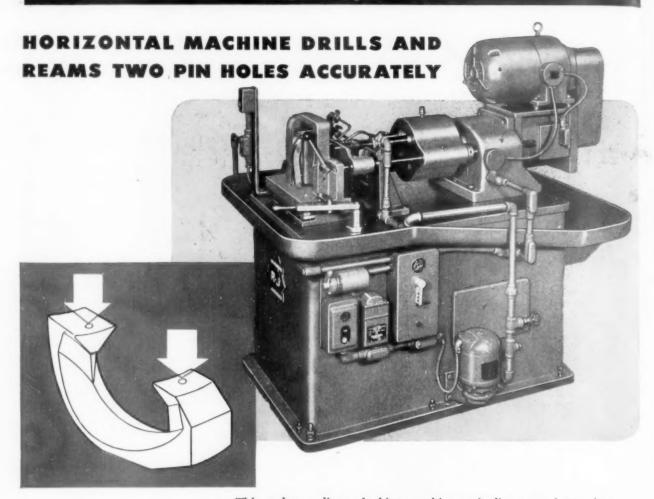
CHICAGO 39, U. S. A.

Eastern Sales Office: 225 Lafayette St., New York 12, N. Y.



NEER

Rehnberg-Jacobson



This is a good example of ingenuity, simplicity, and manufacturing skill typical of Rehnberg-Jacobson machines. Take advantage of our experience in planning your future production lines.

This rather ordinary looking machine embodies some interesting features because it was designed to perform a particularly accurate operation. The piece is an odd-shaped part for an aircraft unit. Two locating-pin blind holes are to be drilled and reamed .1855/.1865" dia. and .250/.260" deep within .0005" of specified positions. A Rehnberg No. 45 Drill Unit with built-in feed control drives a four-spindle head carrying two drills and two reamers. The piece is held in a special slide fixture having lucite clamp facings to prevent any marring or scratching of the highly polished surfaces. The piece is moved from the drilling to the reaming position by sliding the work-holding portion of the fixture with a hand lever. Complete automatic cycling on each operation is started by simply pushing a momentary-contact button. In the drilling position the reamers clear the work, and in the reaming position the drills clear. The user of this machine reports highly satisfactory performance.



REHNBERG-JACOBSON MANUFACTURING CO.

Special Machinery

2137 HISHWAUKEE ST. ROCKFORB, ILLINOIS



ANGLE OF RIM PERMITS EASY AC-CESS TO CUTTER EDGES AND INTO CORNERS. 1/16" DIAMOND RIM PROVIDES RAPID CUT-

SOFT CORE MATERIAL DRESSES AWAY EASILY, EXPOSING DIAMOND SECTION AS NEEDED.

AVAILABLE IN 2 SIZES: 3-3/4" AND 5" O.D.

HEAVY, DEEP COREPROVIDES MAXIMUM SUP-PORT BEHIND DIAMOND RIM.



1/2" DIAMOND DEPTH INSURES LONG WHEEL LIFE.



Felker DI-MET Diamond Abrasive Wheels are made in all standard types in both metal and resinoid bonds. Special wheel types are

made on order. If you have grinding problems requiring diamond wheels, get in touch with our engineering department.

Quick service is assured through our offices and distributors from coast to coast.

Have you received your copy of the Felker DI-MET Catalog featuring metal and resinoid bonded diamond wheels? A postal card will bring it!

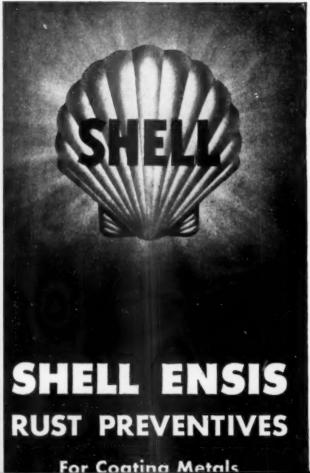
FELKER MANUFACTURING COMPANY

1121 BORDER AVENUE, TORRANCE, CALIFORNIA

MANUFACTURERS OF FELKER DI-MET DIAMOND ABRASIVE WHEELS

At Last. - a line of





For Years american industry has paid tribute to demon rust to the tune of \$1,000,000,000 a year. Rusting of lubricated surfaces has been "put up with" as a necessary evil.

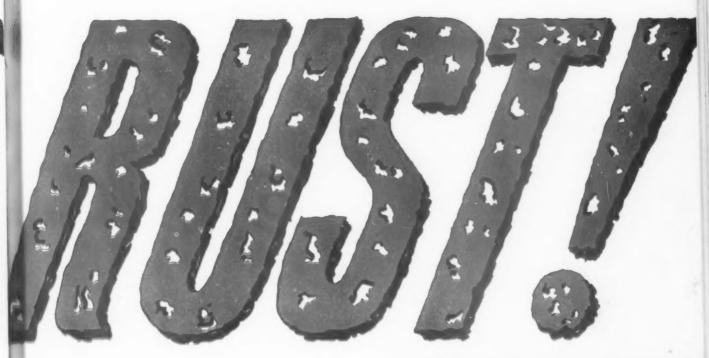
Shell scientists and engineers, working with steam turbine man-

ufacturers, did the "impossible". . . developed a rust-preventive turbine oil.

Using the wealth of knowledge gained by developing and perfecting this oil, Shell's Research Laboratories then focused their efforts on developing a similar line of rust-preventive oils for general industrial purposes. The result is the new Shell Tellus Oils for machine lubrication and the new Shell Ensis Rust Preventives for coating metals.

The new Shell Tellus Oils are not designed to remove rust. They will not eliminate all existing rusting conditions that may be present in your machines. But where moisture is a factor, the new Shell Tellus Oils, because of the special rust-inhibiting qualities built into them, afford unequaled protection against the formation of rust... and without the sacrifice of other valuable.

industrial products to



characteristics. They form a protective film that coats the metal, making it highly resistant to water and moisture. Shell Tellus Oils also have superior oxidation stability.

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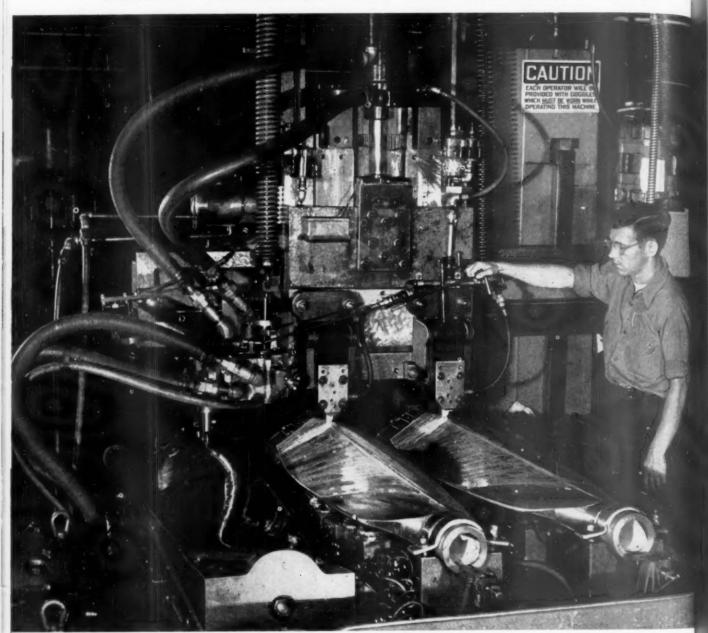
ale

The new Shell Ensis Rust Preventives cover a complete line of oils, coatings and compounds. They are available in a number of grades, designed to give protection against the dangers of exposure, which range from the extreme effects of rain and snow during outdoor storage, to the mild humidity conditions encountered in the factory between machining operations. The protective coatings formed by Shell Ensis Rust Preventives graduate from the extremely thin, transparent oil films that need not be removed, to the heavy, abrasion-resistant coatings which will withstand severe weathering conditions over long periods of time.

Call in the Shell man now! After a thorough study of your operation he will recommend the Rust-Preventive Product best suited to your specific conditions. Write, wire or phone Shell Oil Co., Inc., 50 West 50th Street, New York 20,



THEY TURNED TO TURCHAN....!



HOW TURCHAN CONVERTED A H AND-JOB INTO A MACHINE-JOB

"Turn to Turchan"

SEND US

Sample or Blueprint
of Parts
—for Turchan
Production Estimate

FORMERLY the production of propeller blades was strictly a hand-job. Then along came the Turchan and converted it into a simple machine job of profiling with a planer—performing the operation in 1/20th of the time.

Using a model as a guide, the Turchan Attachment is shown above planing the irregular contour on a forged member of a 2-piece brazed propeller blade, planing it to close tolerances. On other similar operations, such as planing turbine blades, impellers, and large cams of irregular shapes, tolerances are also held very close.

If your production problem is one of finishing parts of irregular or eccentric shape on milling machines, lathes, grinders, planers, shapers or boring mills, send us the part or a blueprint and we'll tell you how the Turchan Attachment can be used to your definite advantage.

TURCHAN FOLLOWER MACHINE CO.



8251 Livernois . Detroit 4, Mich.



IT TAKES MORE THAN JUST A MULTIPLE HEAD TO GIVE YOU REALLY FAST DRILLING



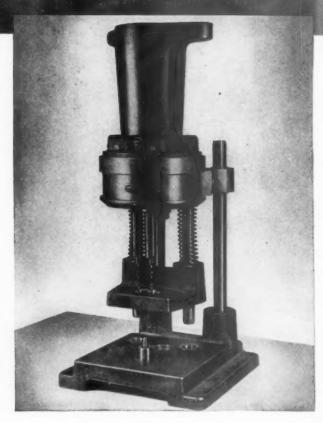
Screw with 2 spanner wrench holes—typical of hundreds of jobs of the same character. Part is simply laid in a nest—location and clamping is automatic—drilling at 5000 r.p.m. Drilling time—zippo!



This part with four holes is handled in the same way as the part above with the pressure pad-bushing plate method. No jigs, no hand clamping — just place the part and drill. Automatic ejection if desired.



Here's a die casting with 8 multiple reamed holes. Nothing to it with the pressure pad method — just lay 'em in the nest and ream. This method is so simple and fast, it pays even for parts with only one hole.



A multiple head is only one factor in fast multiple drilling of small parts. With it, you must have a set-up for fast placing and holding of the parts.

The Ettco-Emrick System of MULTIPLE SPINDLE HEADS

provides both the head and the handling tool-up. When you order a multiple head for a particular part, you get a completely engineered job—engineered to drill the most holes at one time and to give you the fastest handling of the work. Sometimes this means two or three times faster than you can get with a multiple head alone.

The System includes a dozen different standardized handling methods, one of which is the pressure pad-bushing plate, shown above in its simplest form, which clamps the work and guides the drills. It eliminates hand clamping, jigs, etc. You just place the part on the base and drill. The parts illustrated were done with this method.

Note that the Head and all parts are tied together. Simply clamp it onto your drill press and you're set to go. For top production at bottom cost, let Ettco-Emrick engineer your small parts drilling jobs.

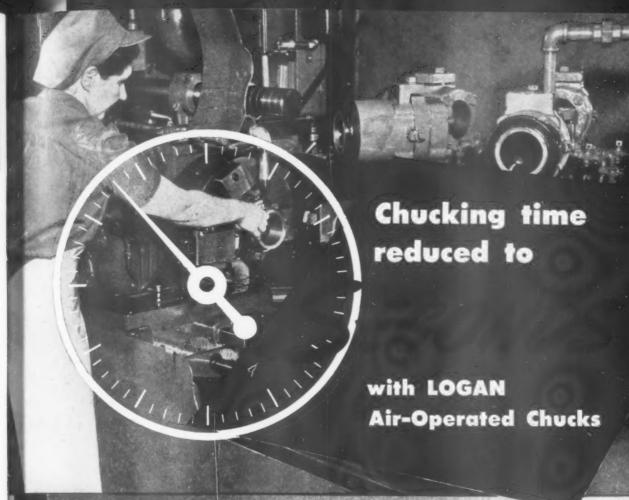
ETTCO TOOL CO.

586 Johnson Ave., Brooklyn 6, N. Y.

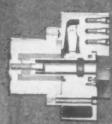
Detroit 1

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Over 25 years specialization in solving Industry's drilling and tapping problems









NEER

on Foster Fastermatic Automatic Turret Lathes

vide fast, accurate, positive chucking of parts -in a matter of seconds - on this job performed on two Foster "Fastermatic" automatic turret lathes.

The part, a hub reduction drive gear, is machined complete in two chuckings. The time and effort saved by means of the Logan equipment enable one woman operator to run both lathes and handle the entire job. Chuck jaws are quickly opened and closed by simply turning the lever of the air control valve. As a result, valuable operating and machine time is saved, production is increased, and hazards from improperly chucked workpieces are eliminated.

In addition, turning accuracy and finish re greatly improved because the unusually

Standard Logan air operated chucks pro- Compact Logan chuck minimizes overhang, thus promoting rigidity and strength of the set-up. The constant, regulated pressure of the chuck jaws prevents distortion of the

> Logan provides all of the equipment required for the complete chuck installation -standard 3-jaw universal chuck, rotating air cylinder, air control valve and accessories, all designed to operate together as a balanced chucking system. Standard chucks are also available in many other types and sizes, and special chucks can be supplied to meet unusual requirements.

> For jobs where hydraulic actuation is desirable, the Logan line includes hydraulic operated chucks, hydraulic control valves and hydraulic power units.



Write for new catalogs covering Logan chucks, air cylinders and accessories, by draulic cylinders, bydraulic power units

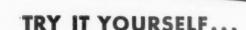
Air and Hydraulic Equipment

LOGANSPORT MACHINE CO., INC.

CHUCKS - CYLINDERS - VALVES - PRESSES - SURE FLOW GOOLANT PUMPS

Do ALL Does in 5 HOUR

The same blanking die that takes 8 hours of tedious drilling and filing to make on the Drill, can be cut by the DoALL in exactly 30 minutes. Not only a 16 to 1 saving in time, but no broken drills, no lost metal.



If you now use a drill for work of this kind—or a vertical shaper or mill, for that matter-make your own comparative tests and see for yourself how many short cuts DoALL offers in tool room or for regular production work.

If you do not have a DoALL in your plant, one of our factory-trained men will gladly call with a mobile demonstrating unit.

DoALL is today's fastest internal and external method for cutting all metals, alloys, plastics, laminates, wood-blocks a foot thick, bar stock, tubing or stacked sheets.









Write for copy of DOALL ADVAN-TAGES, the illustrated story of 8 interesting jobs.

1. PAINSTAKING CENTER PUNCHING 2. TEDIOUSLY DRILLING ROW OF HOLES 3. HAMMERING OUT THE SLUG

. FILING OFF THE DRILLMARKS

INDUSTRY'S NEW SET OF TOOLS

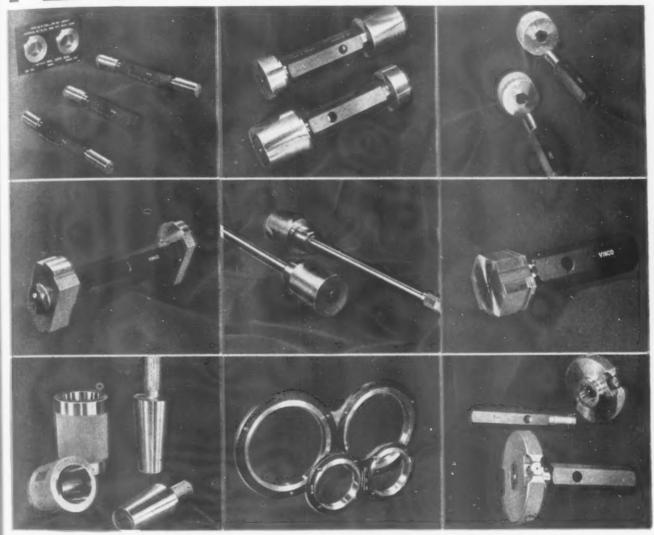
CONTINENTAL MACHINES, INC.

1304 S. Washington Ave. Minneapolis 4, Minn.

Besten, Chicago, Cincinnati, Clovoland, Denver, Dotroit, Eric, Grand Repids, vaukes, Minneapolis, New York, Orlando, Philadelphia, Pittsburgh, Previdence, Rochester, Rockford, St. Louis, San Francisco, Seattle, Tolodo, Tulsa.

PLAIN

GAGES-BUT OF VINCO QUALITY



Simplicity of design plus a great demand have encouraged many gage shops to bid for this type of gage work without having sufficient skill and knowledge to produce the perfection required for constant, accurate gaging. A plain cylindrical gage must not only be accurate but have a hard, durable surface, smooth enough to satisfy the microscopic scrutiny of the surface analyzer. To grind the plug blank down to the required size and

still maintain enough lap stock so the minute grind ridges can be lapped to this required smoothness involves a technique that is not learned over-night, a "know-how" that is developed only after long experience. That is the way WE make them—so if you are in the market for a plain cylindrical plug that is both durable and accurate, the best suggestion we can make is—Buy VINCO.

VINCO CORPORATION, 8857 SCHAEFER HIGHWAY, DETROIT 27, MICHIGAN. SALES OFFICES: NEW YORK, CHICAGO, CLEVELAND

MILLIONTHS OF AN INCH FOR SALE BY V I N C O

Sami-Automatic Hydraulic Spline and Gear Grinder • Optical Master Inspection Dividing Head • Involute Checker • Angle Tangent to Radius Dresser
• Index Plates • Precision Vises • Sine Bars • Straight-side Spline, Serration Spline, Involute Spline and Helical Spline Plug and Ring Gages • Thread

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JANUARY, 1945

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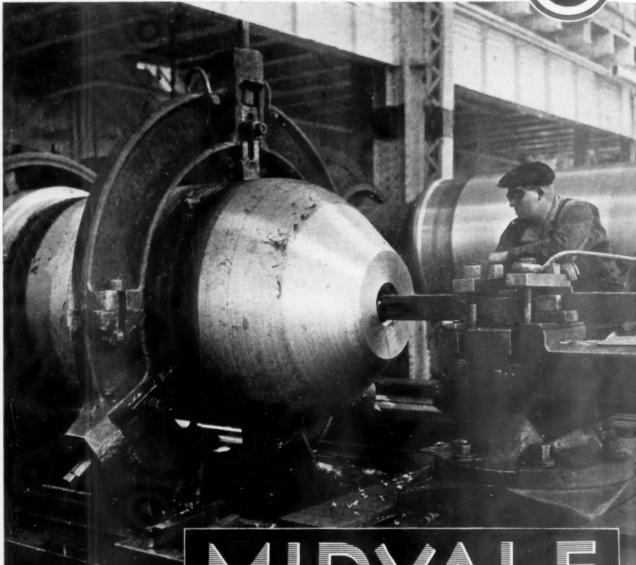
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MEER

PRESSURE VESSELS It is common to nearly all pressure vessels that they must withstand much more than pressure. Corrosives and rapidly changing temperatures subject the metal to conditions of varying severity. Midvale, with one of the oldest and most complete metallurgical laboratories in the industry, combines knowledge with experience. Midvale metallurgists and engineers have shared in the planning and design of notable installations in the oil field and the process industries. And because their studies extend to operation experience, they are doubly equipped to meet unusual and exacting problems.

THE MIDVALE COMPANY · NICETOWN · PHILADELPHIA

OFFICES: NEW YORK . CHICAGO . PITTSBURGH WASHINGTON . CLEVELAND . SAN FRANCISCO

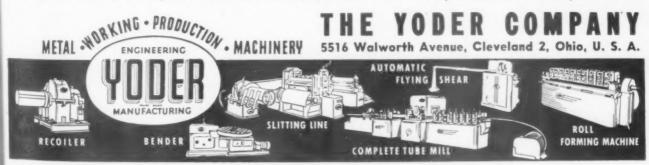


Custom Steel Makers to 9ndustry

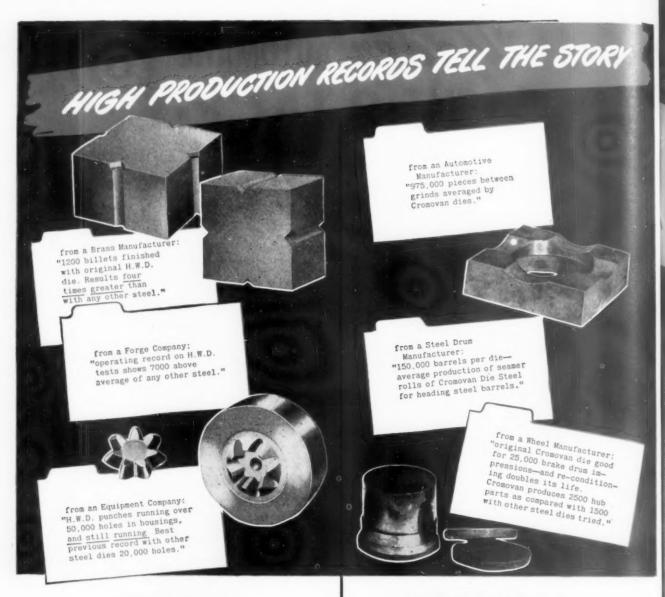


The Yoder Automatic Cut-off Machine is designed primarily to be used in connection with a roll-forming machine, for cutting formed sections on the fly. The forms it will cut, cleanly and accurately, are as varied as your needs. Cutting is accomplished by steel dies, mounted on a movable die-table, and actuated by crankshaft driven by compressed power springs, which are re-loaded automatically while the die-table is being returned to position for another cut. Accurate dies, swift, powerful strokes, assure smooth cuts to extremely accurate lengths, on even the most intricate section.

In addition, this machine may be productively used for straightening or cutting tubing, wire or rods or coil strip stock. It may be fitted with dies or punches for perforating and embossing... it is a versatile production machine capable of sustained earning operation. Let us send you a booklet with complete details.



NEER



HWD

For Hot Work

Performance sheets picked at random give assurance that Firth-Sterling quality die steels will meet your particular high output problem with record-making satisfaction. H.W.D. Hot Work Die Steel provides exceptional toughness, wearing quality and stability. It is recommended for general hot work operations involving severe pressure or impact, including forming, forging and die casting. For detailed operating information, write for H.W.D. Bulletin SL-2014.

The Firth-Sterling line includes six other hot-work die steels

CROMOVAN

DIE STEEL

For Cold Work

Where production in big figures is required, Cromovan is the preferred die steel. It is particularly adapted to cold work and offers the outstanding features of improved machinability, high abrasion resistance, unusual depth of hardness (preventing sinking), and minimum dimensional change during hardening. Used for cutting and forming dies, and for many special operations where conditions are unusual. Send for a Cromovan Bulletin SL-2022.

The Firth-Sterling line includes six other cold-work die steels



Firth-Sterling

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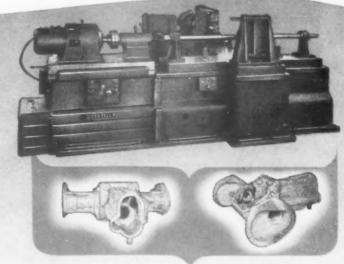
worthwhile savings...

that EX-CELL-O's pioneering in Precision machining now makes possible to you!

TO MAKE sure of a low "unit cost" on high production jobs you're planning for tomorrow, you should get in touch with Ex-Cell-O today. For many years Ex-Cell-O has been foremost in the designing and construction of special multi-purpose and semi-standard machines for America's leading industries, both small and large. A quarter of a century of precision engineering has gone into Ex-Cell-O experience. This "know how" has made the Ex-Cell-O name well and favorably known throughout the industrial world. The advantages of this practical background are available to you now, when the pressure of post-war competition is fast approaching. In making your production plans for the immediate future, give early consideration to Ex-Cell-O multipurpose machines. They frequently perform numerous operations in one setting of the work and often bring a substantial increase in the number of parts hourly produced, also improved quality and lower unit cost.

EX-CELL-O CORPORATION · DETROIT 6





Above: Ex-Cell-O Special Style 58 Two-Way Machine for finish boring center and both ends of differential transmission case (of chrome nickel iron—shown in two views). This Ex-Cell-O machine combined several operations formerly necessary, and greatly increased production.

Below: Ex-Cell-O method of bolted construction. Linked in this manner are the wing sections of the machine that carry the spindles, and the center pad

section that carries the work fixture. This Ex-Cell-O feature of construction provides not only added strength and rigidity but greater flexibility. When desired to machine a part of different dimensions the center section can easily be removed and a section of different size substituted.

Where increased production, high accuracy, and greater economy through multiple operations are required...consult EX-CELL-O.



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steels

INEER

Above: Bulletin on Ex-Cell-O Precision Way Machines For Higher Production and Improved Accuracy. Write for free Ex-Cell-O Bulletin 31631. EX-CELL-O makes:

SPECIAL MULTIPLE WAY-TYPE PRECISION BORING MACHINES

SPECIAL MULTIPLE PRECISION

DRILLING MACHINES

PRECISION BORING, TURNING AND FACING MACHINES, AND FIXTURES

PRECISION CYLINDER BORING

PRECISION THREAD GRINDING
MACHINES

PRECISION LAPPING MACHINES

PRECISION BROACH SHARPENING

OTHER SPECIAL PURPOSE MACHINES

BROACHES AND BROACH FIXTURES

HYDRAULIC POWER HINITS

GRINDING SPINDLES
DRILL JIG BUSHINGS
CONTINENTAL CUTTING TOOLS
TOOL GRINDERS
FUEL INJECTION EQUIPMENT
R. R. PINS AND BUSHINGS
PURE-PAK PAPER MILK BOTTLE
MACHINES

PRECISION AIRCRAFT AND
MISCELLANEOUS
PRODUCTION PARTS



On the drafting board, or on the assembly line, this new "Users' Guide" will tell you at a glance WHAT TYPE of Parker-Kalon Self-tapping Screw to use . . . WHERE and HOW to use it.

All the facts you need are given in only 18 pages of quick-reading tables, charts and detail drawings. You see which of the various types of P-K Self-tapping Screws will give best results in the various gauges of sheet metal, stainless steel, structural steel, various castings and forgings, in the different types of plastics and compositions, in plywood, etc., etc.

You are shown the type of hole, the size of hole, the drill size that is best for the different screw sizes and for different conditions. Other tables give you screw sizes, recommended depth of penetration, head dimensions. Also included are tables of decimal equivalents; details on special screws and head styles; praetical production hints on the use of Self-tapping Screws;

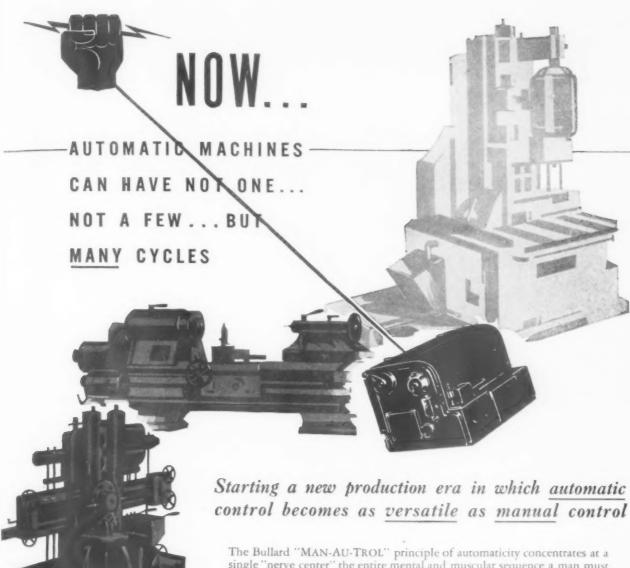
This handy chart will answer the question — "Where can I use the simpler P-K Self-tapping Screw method to save man-hours, speed work, cut cost, increase security. It will help get better results from the Self-tapping Screws you now use.



SELF-TAPPING SCREWS FOR EVERY METAL AND PLASTIC ASSEMBLY

PRAISED BY PROMINENT PLANT MEN - - in companies like Frigidaire, Iron Fireman Mfg. Co., Sylvania Electric Products, Farnsworth Television and Radio Corp., Schick, Inc., Brockway Motor Co., Bendix Radio Div., Bethlehem Shipbuilding Div., Sperry Gyroscope Co. Typical comments: "Will be a great help in our work"... "Proven indispensable – we need 4 more copies"... "Very useful because of its condensed information and intelligent presentation—would like 6 more"... "A remarkable handbook"... "Will prove invaluable in our design and production"... "Best thing of its kind we have ever seeen"... "Very compact and comprehensive"... "Of inestimable value."

PARKER-KALON Quality-Controlled SELF-TAPPING SCREWS



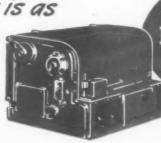
The Bullard "MAN-AU-TROL" principle of automaticity concentrates at a single "nerve center" the entire mental and muscular sequence a man must follow to run a machine . . . with repetitive accuracy no man can match.

In a Vertical Turret Lathe, for example, this means that it could turn out any part in the required quantity ... and then be changed over quickly ... in a few hours, not days... to produce any other part that manual operation could handle... over the entire range of that machine's possible functions.

In other words, the Bullard "MAN-AU-TROL", for the first time in machinetool history, adds the high-speed, low-cost production of special-purpose automatic machines to the versatility of multi-purpose, manually operated machines. In addition, the machine can be shifted to manual operation by moving a single lever.

The Bullard Company, Bridgeport 2, Connecticut.

The automatic control that is as versatile as manual control



100% automaticity ... no human or cumulative error . . . control to closest tolerances a tremendous cost advantage in competitive markets!

RECONVERSION PROBLEM SOLVED!

American H-2-30 STANDARD BROACHING MACHINE ADAPTED TO MANY "SPECIAL" JOBS!

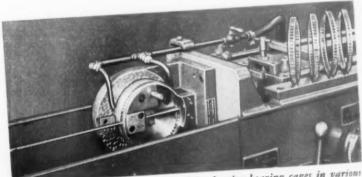
This standard American broaching machine, designed for use in many types of war production, is cheaply and quickly converted to peacetime manufacture. Considerably less expensive than especially built equipment, it will perform a large number of "special" jobs accurately and economically.

The set-up for one such job is illustrated at the right: To broach rectangular holes in aircraft bearing cages. Two opposite holes are broached at each pass. Starting with a drilled hole, three passes, each with a slightly larger broach, are required for each hole. Exceptional finish at a high production rate is assured.

American's complete broaching service—machines, tools, and engineering—is available to speed your production. Let American engineers help solve your precision manufacturing problems with standard machinery that will save you valuable time and money. Write for further details.



ABOVE: Standard American H-2-30 Horizontal Broaching Machine reconverts easily from war to post-war production.



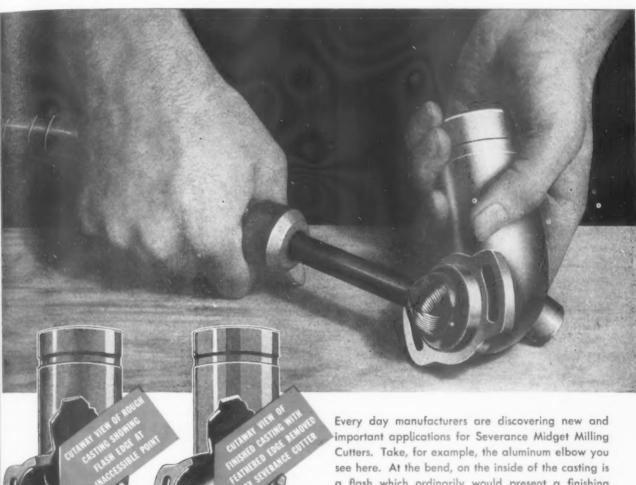
Close-up view of set-up described at left, showing bearing cages in various stages of completion.





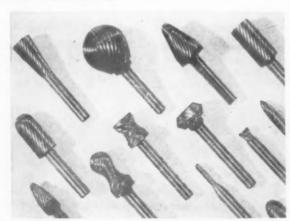
Use proper and sufficient lubrication when broaching. It is cheap life insurance for broaching tools.

SEVERANCE MIDGET MILLING CUTTER GIVES PERFECT FINISH INSIDE INTRICATE CASTING



No matter what your finishing requirements may be, there is a Severance Midget milling cutter made to fit your needs.

Severance regrinding service saves you time and money. Severance complete line of "Carbide" midget milling cutters are now available.



a flash which ordinarily would present a finishing problem. But with a Severance Special Ball cuttor, this hard-to-get-at ridge is quickly and perfectly

Severance Midget Milling Cutters are efficiently finishing castings, parts and patterns made of metals, alloys, plastics and wood. With portable power tool, with stationary set-up or by hand, Severance Cutters do the finishing job cleaner, faster and easier.

If you wish to speed up your finishing of manufactured parts send us samples. Our engineers will help you determine the kind of cutter best fitted to your

MIDGET MILLING CUTTERS . PRECISION REGRINDING SEVERANCE TOOL INDUSTRIES INC., SAGINAW, MICH. . PLANTS IN LONG ISLAND CITY, N.Y.; DETROIT, MICH.; FORT WAYNE, IND .: CHICAGO: AND LOS ANGELES

JANUARY, 1945

Telection

industrial diamonds ...time is the teacher

In metals, the quality of the product is determined by the x-ray, Brinell hardness and other tests for fatigue, tensile strength, etc. In diamonds there is no simple way to TEST the hardness and suitability of a stone.

Only by long experience in the selection and application of diamonds for use in a wide variety of industries, is it possible to develop the knowledge and "feel" of stones capable of performing maximum service at minimum cost. J. K. Smit, for more than a half century, has been building a reputation which now makes them the Tiffany of the industrial diamond field. The purchase of diamonds selected by J. K. Smit assures the user of getting the greatest service from:

- an OCTAHEDRAL diamond in a Sta-kool or other single-point tool for truing and dressing grinding wheels.
- an OVAL stone selected for the curved nib of a Ready-set tool for the same purpose.
- a SINGLE African or Brazilian bortz diamond selected for a shaped boring tool.
- MANY SMALL diamonds for use in core bits, selected for their sharp rock-cutting edges.
- WHOLE diamonds, reduced by special process to diamond powder of even grit for use as powder and as the abrasive agent of diamond wheels for sharpening the now popular carbide tools.



Possession of large stores of diamonds insures perfect selection and prevents price fluctuation. The J. K. Smit Technical Advisory Staff will gladly assist your Production Department in the solution of its diamond tool problems.





DIAMOND WHEELS

TOOLS FOR DRESSING WHEELS

CORE BIT

METAL WORKING TOOLS

POWDE



QUENCHED AND TEMPERED

NICKEL STEEL

FORGINGS COMBINE

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EXCEPTIONAL DUCTILITY WITH

HIGH TENSILE STRENGTH

Composition and Typical Properties of Normalized Quenched and Tempered 23/4% Nickel Steel Rods

Description or Size	Melt Yield Pt. No. #s per Sq. In.	Tensile Strength #s per Sq. In.	Elong. % in 2 In.	Reduc- tion in - Area %	ANALYSIS					
					Car.	Mang.	Phos.	Sul.	Sil.	Ni
Main Rod	92900	110000	25.0	64.4	.31	.78	.027	.026	.25	2.75
Main Rod	86500	104500	25.5	65.6	.32	.86	.034	.032	.29	2.69
Main Rod	86360	104400	26.0	64.8	.32	.86	.034	.032	.29	2.69
Main Rod	87850	102350	26.0	66.2	.31	.89	.037	.025	.32	2.69
Front Rod	86000	102250	25.0	67.3	.29	.82	.035	.027	.24	2.71
Front Rod	83900	104250	25.0	66.1	.29	.82	.035	.027	.24	2.71
Front Rod	86850	104250	27.0	66.1	.32	.86	.035	.025	.30	2.65
Front Rod	89500	107050	25.5	65.6	.32	.86	.035	.025	.30	2.65
Back Rod	39500	107650	25.0	62.7	.30	.79	.030	.025	.22	2.71
Back Rod	87500	106450	25.0	65.4	.29	.82	.035	.027	.24	2.71
Back Rod	87000	105600	25.0	65.4	.29	.82	.035	.027	.24	2.71
Back Rod	88150	104850	26.0	66.8	.29	.82	.035	.027	.24	2.71

Specimens Taken from Mid-Section of Prolongations of the Forgings

The above table compiled by the American Locomotive Company shows the chemical compositions and mechanical properties of some normalized, quenched and tempered nickel steel front, main and back rods recently produced as replacement rods for locomotives being speeded up and rebalanced. These values are typical of replacement rod forgings recently tested by that company.

Quenched and tempered nickel steel forgings provide high tensile strength and ductility, combined with unusual toughness and high fatigue strength—qualities which tend to obviate breakage and assure long, trouble-free service when employed in heavy duty machinery and equipment.



makes it easy for you to get booklets and bulletins on industrial applications of Nickel, metallurgical data and working instructions. Why not send for your copy today?

* Nickel *

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall Street, New York 5, N.Y.
JANUARY, 1945

LOOKIS

SUPER RESERVED



It's truel Down go prices on SUPER Shell End and Face Mills! Ever increasing orders from users, improved manufacturing techniques, increased production facilities, engineering research and development . . . these are reasons why the new low prices shown below are possible.

If you have been using SUPER Shell End and Face Mills you know of the production economies resulting from the faster cutting and the cleaner cutting that these tools produce. You know, too, of the finer finishes, the greater accuracy and the longer tool life with these cutters on the job.

Now add to these economies the savings you get from these new low prices and you'll agree . . . SUPER Milling Cutters are real MONEY SAVERS!



PRICE LIST

	FOR GEN	IERAL USE	FOR	NEW		
SIZE	No. of Teeth	Stock Number	No. of Teeth	Stock Number	PRICE	
		SHELL EN	ID MILLS			
11/4"	4	GSM-1	6	SSM-1	\$17.00	
11/2"	4	GSM-2	6	SSM-2	18.00	
13/4"	4	GSM-3	6	SSM-3	19.00	
2"	4	GSM-4	6	SSM-4	19.50	
21/4"	6	GSM-5	6	SSM-S	20.00	
21/2"	6	GSM-6	6	SSM-6	20.50	
23/4"	6	GSM-7	6	SSM-7	21.50	
3"	6	GSM-8	6	SSM-8	22.50	
31/2"	6	GSM-9	6	SSM-9	25.00	
4"	6	GSM-10	6	SSM-10	27.50	
41/2"	6	GSM-11	6	SSM-11	32.00	
5"	6	GSM-12	8	SSM-12	35.00	
51/2"	6	GSM-13	8	SSM-13	37.00	
6"	6	GSM-14	8	SSM-14	40.00	
		FACE	MILLS			
8"	8	GFAC-8	10	SFAC-8	60.00	
10"		CEAC 10	12	SEAC ID	75.00	



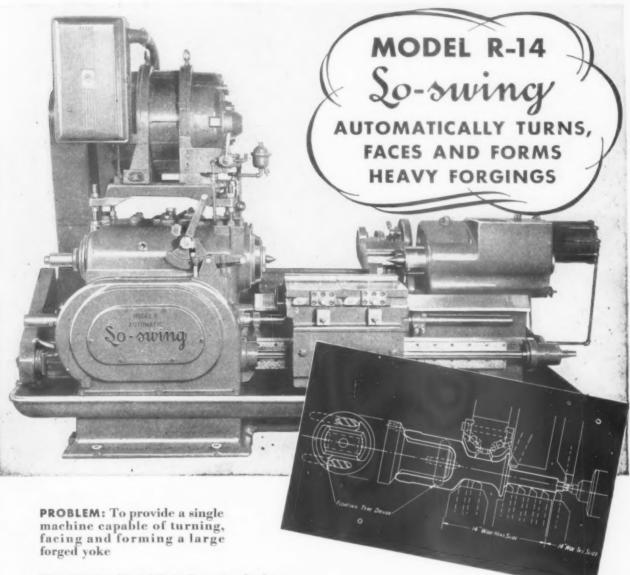
SUPER TOOL COMPANY

Carbide Tipped Tools

21650 Hoover Rd., Detroit 13, Mich. 4105 San Fernando Rd., Glendale 4, Cal.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-owing PEOPLE" SENECA FALLS, NEW YORK

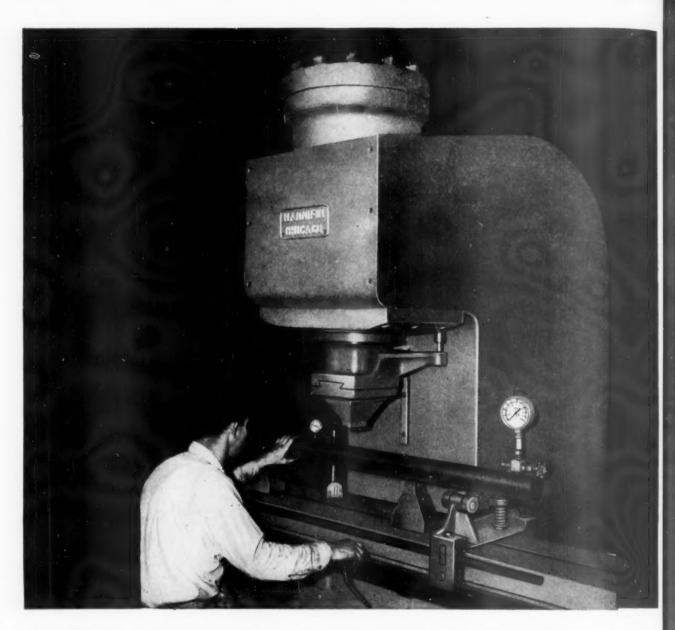


SOLUTION: Model R-14 Lo-swing Lathe was selected for this job because it has the power and rigidity necessary for the wide form tools which machine the undercut section near the yoke, as shown in the tooling layout opposite. Turning of the undercut section and the stem is accomplished with six

tion and the stem is accomplished with six tools mounted in tool blocks on the head slide and a seventh tool, mounted on the independently-operated tail slide. Facing and forming tools are mounted on two independently-operated back slides. The one carrying the facing tool has a coarse feed, while the other has a fine feed suitable for the large, constant profile form tools.

Independently-controlled slides are one of the important advantages obtainable in Lo-swing design. Submit your turning problems to Lo-swing engineers for time-saving solutions.

LATHE NEWS from SENECA FALLS



A delicate touch ... measured in tons

This Hannifin hydraulic press is being used here to straighten a large boring bar, but it also does a variety of large and small straightening work in the heat treating department of Western Gear Works, California Division. Sensitive pressure control, an exclusive Hannifin development, provides the delicate touch with power behind it, for fast accurate straightening operations on tools as well as precision

parts. Hannifin sensitive pressure control provides any ram pressure, from a few pounds to full 75 ton capacity, at a finger tip touch. The operator devotes his full skill and attention to the work, for control is so simple and natural that it becomes almost automatic. Ease of control makes this press readily adaptable to many kinds of work.

Hannifin hydraulic presses are built

in a full range of standard types, 5 tons to 150 tons, for straightening, forming, press assembly, and similar operations. Write for descriptive bulletins, or consult Hannifin engineers for specific recommendations.

HANNIFIN MANUFACTURING COMPANY 621-631 South Kolmar Ave., Chicago 24, Illinois



PRODUCTION PERSPECTIVES

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

WAR PRODUCTION: European military reverses have shifted attention from overall war production to "critical programs." November witnessed sharply increased output in 15 critical categories, but industry was still behind schedule in 8 of these programs. Net production gain in these most-needed military items was 11 per cent, but still 4 per cent short of overall goals.

DETAILS: November's big news was made by Superfortress builders, who boosted their production 30 per cent....Heavy artillery output rose 23 per cent; critical ammunition, 15 per cent; and tanks, 4 per cent. Navy assault transports and cargo ship construction for Pacific fighting increased 12 per cent....WPB credits changed worker attitude, induced by adverse German-front news, for increased output. Preliminary December production figures look even better.

OUTLOOK: War production will hold the spotlight during the next few months. Reconversion talk and planning are out.... In a move designed to discourage the movement of labor from war plants, all civilian production has been frozen at December 7 levels of output. WPB will hold the line on this order.

SPOT AUTHORIZATION: Further resumption of civilian manufacture under the "spot authorization plan" has been banned for 90 days in some 120 cities with acute labor shortages....Total output approved to date under spot authorization has been negligible. Many of the 2,000 plants given a go-ahead have found WPB material allocations too small to get production started.

SURPLUS DISPOSAL: War property surpluses mounted to \$848,620,000 by December 1. RFC, Government disposal agency, has sold \$112,795,000-worth to date at 76 per cent of cost or appraised value. Aircraft and machinery top the list of excess goods....Springfield, Massachusetts, has been selected as storage headquarters for surplus machine tools in New England (see page 125)....Attack on mounting cutting tool surpluses is expected momentarily. Disposal plan proposed by manufacturers (see page 130) is believed to be the basis of the RFC program....
Britain reportedly has agreed to "buy" all its U.S. Lend-Lease machine tools.

MACHINE TOOLS: One of the most serious bottlenecks in the current war production "urgency" program, the machine tool industry is pinched for manpower as never before. Undersecretary of War Patterson told the story in one sentence: "The lack of machine tools is retarding shell production."...The pressure is on all builders producing shell turning and finishing equipment.

OUTPUT: November machine tool shipments dropped 1.9 per cent below October's, were valued at \$36,803,000. Of this total, \$1,403,000 was for unrated "civilian and postwar production." December military reverses are expected to cut into recently growing unrated output. Bouncing upward 9.4 per cent the November backlog totaled \$233,753,000. Almost one-half of this 6.4 months output is for unrated orders. About 90 per cent of these are from automobile makers.

THE WONDER PLANT: Ford's Willow Run, currently producing 75 per cent of all B-24 bombers, has received another lease on life. New, increased Army schedules call for output only slightly under the bomber-an-hour pace maintained there last spring and summer....Willow Run output exceeded 5,000 ships in 1944, is described as a production miracle. To meet changing Army requirements, more than 1,000 major design changes have been made in the 4-engine bomber by the auto builder. These involved in excess of 1,000,000 tooling hours and more than 500,000 engineering hours.

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LAST-MINUTE NEWS REVIEW OF MASS MANUFACTURING

JANUARY, 1945

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TWO LINES THAT

IS MARREN STREET NEW YORK



TAPS, DIES, GAGES, SCREW PLATES, TWIST DRILLS, REAMERS, PIPE TOOLS GREENFIELD, MASSACHUSETTS

TO OUR CUSTOMERS:

Final arrangements for the purchase by the Greenfield Tap and Die Corporation of The Geometric Tool Company of New Haven, Connections here been completed. ticut, have been completed.

The acquisition of this nationally known firm of precision tool-makers will broaden the base of Greenfield's service to industry — in research, screw thread engineering, and in the production and distribution of a complete line of precision threading tools and gages.

The Geometric Tool Company, as you may know, makes self-opening die heads, chasers, collapsing and adjustable taps, chaser grinding ing and threading machines. Its experience fixtures and threading machines. Its experience fits in ideally with our own knowledge of cutting tools and cases. ting tools and gages.

We plan to operate The Geometric Tool Company as a division of the Greenfield Tap and Die Corporation, pooling our engineering and manufacturing experience to provide better threading tools and screw thread service than ever before.

Very truly yours,

GREENFIELD TAP AND DIE CORPORATION

Mullar President

D.G.Willar-M



THE GEOMETRIC TOOL COMPANY New Haven, Connecticut

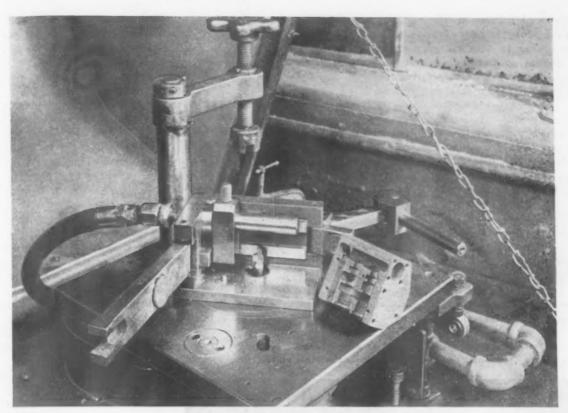


FIGURE 1. Recessing, or undercutting machine, showing holding fixture, recessing tool, and cutaway of workpiece.

PRECISION TOOLING FOR MASS PRODUCTION

Few Mass-Manufactured items are produced to the high precision specified for components of hydraulic valves used in military aircraft. With wing flaps, landing gear, gun turrets, bomb bay doors, cowl flaps and other mechanisms controlled hydraulically, leakage in valve parts can be disastrous.

As a leading producer of hydraulic equipment, Adel Precision Products of Burbank, California, has approached the problem of mass prduction to close tolerances from two angles. First, simplification of design has permitted concentrating tooling talent on fewer operations than might ordinarily be encountered in hydraulic valve production. Second, machine and tool engineering of high order has been applied to economical but quality production.

One result of tooling ingenuity is a device for recessing valve holes. For this job, Adel designed a machine which automatically produces round,

GERALD ELDRIDGE STEDMAN

elongated or irregularly shaped recesses in previously bored holes (Figure 1).

Important to understanding this application, and the preceding sequence of operations on the valve body, is a description of the particular product involved. Adel has designed a valve known as the "Mighty Midget" which is capable of performance beyond that of some valves twice its size (Figure 2).

It is a 4-way selector valve, measuring $2\frac{1}{4}$ " high by 1-17/32" thick, and it weighs 11 ounces. The valve is available in two port sizes (9/16-18 and 7/16-20 NF-3 thread).

The present model has been adapted by Adel to a group of functions:
(1) a 4-way selector valve for single installation, (2) a manifolding enlargement of function for installation where several units are involved in close proximity, (3) a stacking ar-

rangement for multiple installations involving space restrictions that require a close paralleling.

All operating parts of the Mighty Midget, with the exception of the cam shaft, may be serviced by removing the two top cams without breaking any lines or fittings. The cam shaft and packings are readily accessible by the removal of four screws which hold the shaft in place.

A continuous process of simplification has led to development of the present design. The body of the original model involved nine undercuts and 24 1/8" holes. Simplification eliminated two undercuts by drilling port holes at an angle, and by substituting milling cuts for drilled holes in the cam shaft.

A further step eliminated the center port and its undercut. Bottom plug was also removed. After 16 small drill holes were eliminated, the product was such that 90 per cent of its parts were interchangeable for a series

of 16 combinations of the units.

In machining the body of the valve, a substitution in stock furnished for the job has resulted in eliminating three of five machining operations. Originally, the body was machined from bar stock, requiring five operations to produce the rough shape. Now, the work is received as an extrusion, formed to a tolerance of plus or minus .005". It is cut to a rough length of 23/8" (Figure 3) and milled to plus or minus .001".

Succeeding operations are coordinated so that only two locating methods are employed in the entire sequence of operations. Six operations involve locating from two sides and the bottom, and five operations locate from a cam hole. Obviously, such coordinations reduces to a minimum rework, rejects and scrap caused Ingenious machine and tool engineering results in the economical production of aluminum hydraulic valve. Western firm's automatic recessing machine features cam control through hollow spindle

by accumulation of error in the work.

The first significant machining operation on the body involves straddle milling to 2.250", plus or minus .001", on a Model "K" Milwaukee vertical mill with a 16" rotary table. Inserted carbide teeth flycutters, turning at 1800 rpm, are used in a continuous milling process, with loading and unloading accomplished while the rotary table and fixture are moving at a speed sufficient to attain a feed of 14" per minute (Figure 4).

Production is 92 pieces per hour Twelve parts are loaded on the table

Formerly, this work was performed on a horizontal machine. This required three separate operations, with the pieces clamped on the rail, and two operations in the vise. Production was 30 pieces per hour.

In the next operation, the cam hole is drilled on a Natco machine The operations sheet describes it as "drill 19/32 diameter through, core drill 39/64 diameter through, ream .622 - .623 diameter through (continuous drilling)." A rotary fixture, designed for the drilling operation, has four stations, including one for loading and unloading. The work is cam-locked against a positive 2-way locating block.

The following three operations involve continuous drilling of a sequence of holes on one setup. In these operations, the work nests against the same locating surfaces.

The first operation consists of drilling two valve holes through the cam hole with a core drill of 21/64", and a ream of .3467" Figure 5. In the next operation, eight No. 29 retainer holes are drilled, and the third operation produces six No. 29 holes and four No. 22 holes to accommodate bracket and mounting, loading is progressive.

This operation was performed originally in a tumble jig. Design simplification has permitted machining improvements in this drilling sequence resulting in a 671 per cent increase in production.

Drilling and counterboring operations to close tolerances are performed with jigs and fixtures of the type shown in Figure 6.

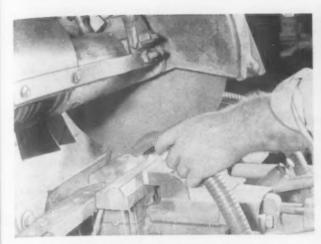
CUTS VARIETY OF RECESSES

The Adel-designed automatic recessing machine works rapidly within valve holes to produce recesses ranging from .562" to .812" diameter. It cuts round, elongated, or irregularly shaped recesses through round holes that have been previously bored in solid stock. Completely cam controlled, the machine can be operated by unskilled labor.

The principle of the machine design involves an "L" shaped tool which is secured in an inverted hol low spindle designed to feed the tool horizontally from the center line of the vertical spindle. Cams control horizontal tool feed and vertical table

FIGURE 2. Model hook-up of Adel isodraulic system which employs 4-way hydraulic selector valve.





Above: FIGURE 3. Cut-off of extrusion prior to machining hydraulic valve body.

movement. Work is clamped to the table over a central hole.

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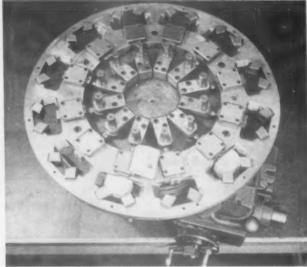
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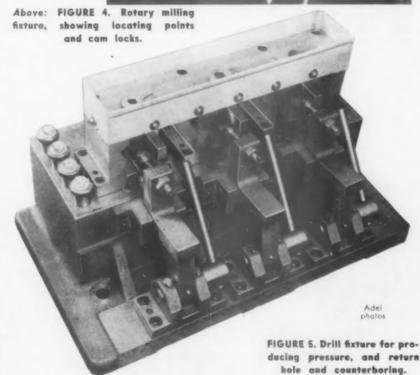
With the tool revolving in a retracted position, the table with the work in position is lowered over the tool to required depth. The tool then feeds to specified depth of recess, is retracted, and the work is raised off the spindle.

The most important design feature is the spindle which is split on the longitudinal center line. A groove is provided in each half so that the assembled spindle has a rectangular channel through its center. The halves are held together by screws, the roller-bearing assembly, and the drive pulley. In addition to the vertical channel, there is a horizontal slot through the inverted spindle near its upper end.

Two floating blocks ride within the spindle, an inverted "T" block being positioned in the intersection of the channel and slot. Stem of the "T" has a tapered hole in which the shank of the tool is secured. Its dimensions permit controlled and direct horizontal movement within the vertical channel and horizontal slot. In the bottom of the inverted "T" is a hole, running at 30° to the vertical axis.

The second, or lower, floating block rides in the spindle channel, directly beneath the cross-bar of the inverted "T" which is positioned in the horizontal slot. The upper surface of this second block carries a heavy pin, set at a 30° angle. As this block moves up and down within the spindle channel, the pin enters and withdraws from the hole in the upper block causing it to move in a horizontal direction. This movement controls the diameter of the circle generated





by the cutting edge of the tool.

On the lower end of the lower block is a double thrust ball bearing assembly. Tool control cam causes this bearing to move upward by means of a lever and connecting bar.

Automatic operation of the machine begins after the work is clamped in the jig on the table. It is effected by moving a lever which engages the clutch that starts the cams revolving (Figure 7). The table cam lowers the work over the revolving tool to the required depth. The tool cam then feeds the tool out to required diameter and withdraws it to the retracted position. The same cam disengages the clutch, completing the cycle of the machine's operation.

The variety of recesses which may be cut is related directly to cam and tool design. If the entering hole is large in relation to the size of the recess - permitting use of a sturdy tool and light cuts-a gang tool with two or more projected cutting edges can produce several recesses simultaneously.

A tool with a single cutting edge can cut several recesses consecutively in one operation cycle. The recesses ·may be of different diameters, widths and spacings. This is all controlled by the design of cams such as those shown in Figure 8.

Elongated recesses are produced

from a circular recess. In this procedure, the clutch is disengaged and locked. The work is fed off-center against the revolving tool by a hand screw located under the table. The work is then returned to center position, the clutch interlock is released, and the table is raised for unloading the work. Irregularly shaped recesses may be cut by means of a pantagraph attachment.

The spindle is turned at 2400 rpm by belts from a vertical shaft motor. The cams are driven from the opposite end of the same shaft by means of belts, gears and a clutch.

The machine has a number of adjustments:

• (1) The belt drive from the motor to the gear reducer consists of a twostep cone pulley on the motor, a double two-step on the counter shaft, and a two-step on the reducer, and two belts. This provides four speeds for the cams.

• (2) The clutch has an adjustable plate by which it will disengage at a whole revolution, also at one-half or one-third. The whole revolution is used for two or more recesses, and the half or third for one shallow recess.

• (3) A micrometer screw adjustment sets the table to cut the recess to the correct distance from the outside surface of the work. This compensates for variation in tool shank length.

• (4) A micrometer screw permits adjustment of position of the double thrust housing in relation to tool cam, compensating for grinding the cutting edge of tool.

• (5) Table guides are adjusted by gibs and shims to place table hole over exact center of the spindle.

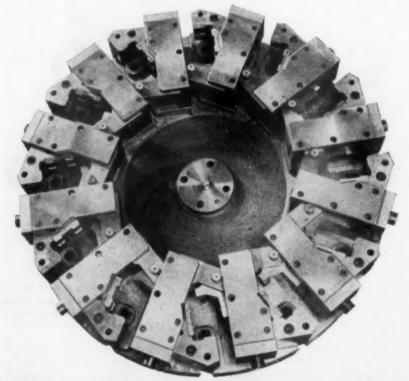
• (6) The table has an air cylinder to cushion the drop of the table, and to prevent the roller from pounding the cam. The speed of drop may be controlled by the orifice in the cylinder.

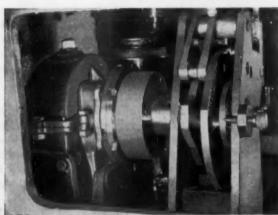
• (7) The tension of the spindle belts and the cam drive belts is readily adjustable.

Gages are provided for precision setting of the tool. The cutting edge should be tungsten-carbide, ground with a fine diamond wheel and honed to a high polish. This produces a fine work finish. Most of the cutting is done on the end of the tool. However, a slight side cut may be produced through design of the table control cam. For accurate work, all surfaces on the cams having a fixed radius must be ground to close limits. Sloping surfaces should be blended on a belt sander.

Chips are removed and the tool kept cool by either compressed air or vacuum. Each method has its advantage for certain classes of work. The compressed air is more powerful, but a padded hood is required to deaden noise and catch chips.

The cutting tool is run dry. Kerosene spray was tried, but the chips clogged the machine. The End





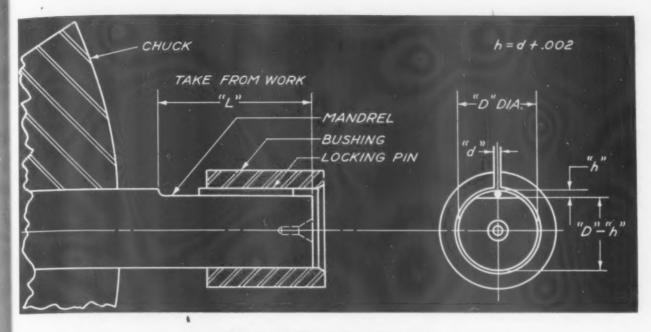
Above: FIGURE 6. Ro-

Left: FIGURE 7. Camdrive arrangement controlling operation of recessing machine.

Right: FIGURE 8. Cams and recessing tool for automatic tool as designed by Adel.



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IMPROVED DRIVE MANDREL

Simplicity of design permits furnishing tool for short as well as long runs. Disadvantages of tapered and expanding types are overcome

When hollow cylindrical parts, such as bushings, have to be machined in small quantities with close limits on their concentricity, expanding or slightly tapered mandrels are commonly used. After forcing several bushings on and off the tapered mandrel, it is sometimes distorted so that the work runs out. The expanding type mandrel is more costly, and uneven expansion frequently causes the parts to run eccentric.

A solution to these difficulties is found in the drive mandrel which involves the principle of the overriding clutch to a stub arbor. Illustrated in Figure 1, is a mandrel and one of a number of bushings, to be ground after hardening, and then machined to odd diameters. For reasons of economy in grinding, the eccentricity of the internal and external diameters is to be held to a minimum.

After cutting off blanks with tolerance for finish, they are drilled and bored to the desired inside diameter minus the allowance for grinding and one end is faced square. The stub arbor is turned so as to have a slip fit

RUDOLPH REGEN

TOOL ENGINEER
HUGHES AIRCRAFT COMPANY

with the bushings. Without removing this stub arbor from the chuck, a flat in proper proportion to its diameter is milled out. The depth of this flat should be equal to the diameter of a standard drill rod—plus one or two thousandths and parallel to the center line of the mandrel.

A recommended size for H in Figure is .062" for a 1" ID bushing. Larger or smaller diameters can be

established proportionately.

The bushing is slipped on the mandrel and the pin inserted. A slight twist of the bushing in the opposite direction from the rotation of the lathe will set it right. The heavier the cut taken, the tighter the bushing. The smaller diameter pin used, the easier the bushing will lock on the mandrel.

The limiting factor is the bearing strength of the mandrel. If a soft mandrel and too small a pin are used, the pin will tend to bury itself in the

*NEXT MONTH

Another Feature on Automotive Tooling

In February, Streamlined Production will describe in detail the methods by which production engineers at Nash-Kelvinator slashed manpower, machine and material requirements. Methods range from milling to tumbling.

This company's war-time manufacturing experience involves mass production of ordnance fuses, propeller governors, aircraft engines, propellers, and other products.

flat of the mandrel and eventually fail to lock. Too large a pin will not have enough wedging action and will fail to take hold.

If a large number of bushings are to be turned it may be practical to turn up an oversize mandrel, mill the flat on it, harden and temper it. Rechuck it and grind to a slip fit with the bushings by means of a tool post grinder. Such a mandrel is very efficient because the high bearing strength of the hardened steel permits the use of small diameter pins.

To remove a bushing after the cut is finished, it is given a twist in the direction of rotation of the lathe. If the bushing is chucked with its squared face toward the chuck, and a short enough pin is used, the other face of the bushing may be squared in this operation. Also the bushing may project beyond the arbor and the bore may be chamfered.

Since no hammering is required to chuck or remove the bushing, this cause for eccentricity is eliminated. The slip fit between the mandrel and bushing should be a close one as any allowance in the fit will show up in an eccentricity of the bore, equal in magnitude to the allowance in fit.

This system has been used for driving lathe work from No. 30 (.128") to many inches in diameter.

The short time spent in making the drive arbor pays many times for itself in trouble free machining of even short runs. It has also been used on finish grinding hardened cylindrical parts of odd as well as standard diameters with good results. The End

Staggered Tooth Vertical Milling Center

MILLING TIME has been reduced 1 40 per cent, cutter life has been increased, and regrinding and sharpening of tools has been considerably speeded up by the development of a new milling cutter at the Philadelphia Maintenance and Repair Department of Westinghouse.

A total of eight sintered carbide tools are mounted in an adapter to make a staggered tooth vertical milling cutter. The tools are not equidistant from the center, but are mounted so that each tooth is set 3/32" closer to the center than the preceding one.

The tools are also mounted in such

a manner that each tooth projects 1/16" more than the preceding one. Hence, each tooth cuts not only in a different vertical plane, but in a different horizontal plane as well. Slots in the adapter have a 10° angle that gives a negative rake to the tool. Figure 1 shows how the cutting tools are mounted in the adapter. Figure 2, showing the depth of cut, also illustrates the "steps" the cutters make as the adapter rotates.

Since its development, the cutter has saved machining time by removing eight times as much metal in a given time as the conventional cutter. The staggered tooth design can

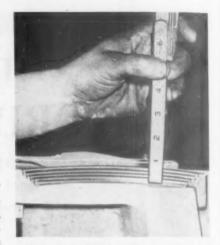
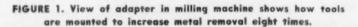


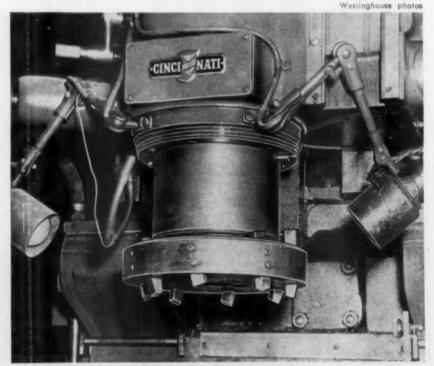
FIGURE 2. Although cutter can take 1" depth, usual depth is 1/2".

take up to 1" cut where the ordinary milling cutter can take a maximum of only 1/4".

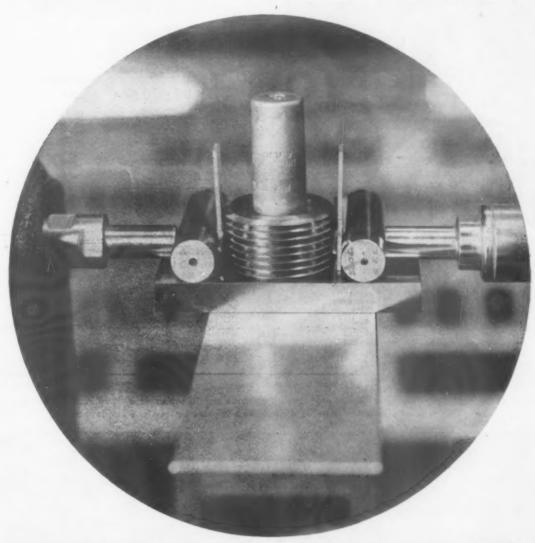
When used for roughing and semifinishing work, the usual depth of cut is ½". In this case, the eight separate teeth take only a 1/16" cut. The individual cutters are tipped and run at quite high speeds. One setup was made to take an intermittent cut ¾" deep on cast steel at 80 rpm, and with 1" feed.

Another advantage of this development is that as the cutter requires sharpening, it is not necessary to remove the entire cutter head. Only the eight dull tools are removed, and a replacement set installed. The time necessary to make this change is but five to 10 minutes. A complete set of eight tools can be ground in about 15 minutes, whereas to grind and sharpen a milling cutter for the same type of work would require about four hours. Total savings are unusually impressive.





Carburetor manufacturer develops method to check points on gage where wear occurs most frequently. Simple, practical and accurate method eliminates "human element" and is widely applicable



Muman element is replaced by definite, known factors, in tapered pipe thread gage inspection.

Experience required is no more than that needed for checking conventional straight threads.

GAGE CONTROL Assures Aircraft Pipe Thread Accuracy

by the aircraft industry has introduced manufacturing problems which have never been associated with it. The difference between this application and conventional employment is that connections involving tapered pipe threads on aircraft are subject to terrific vibrations and strain, increasing the need for accurate fabrication. Production and in-

E. R. HUDSON

ILLINOIS DIVISION
BENDIX AVIATION CORPORATION

spection problems have thus increased, but perhaps the greatest burden of responsibility for output to new and rigid specifications falls on the gaging practice involved.

Too much stress cannot be put on the importance of providing a quality pipe thread, where a self-locking, leakproof connection is intended. These features can only be obtained by producing a consistent taper and uniform body of thread, and these requirements demand a close surveillance on gages. A practical gage inspection technique has been developed by the Illinois Division of Bendix Aviation Corporation. Incorporating formulas for measuring the taper pipe thread plug gage, it appears

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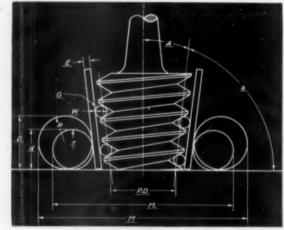
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FIGURE 1. SETUP AND FORMULAS INITIAL INSPECTION



equals Angle of Taper

equals Angle of Computation

equals Diameter of Large Rolls equals Diameter of Small Rolls

equals Parallels (gage blocks)
equals Correction Factor for Parallels
equals 3-Wire Constant (4 wires used)
equals Correction Factor for Wires
equals Diameter of Best Size Wire

P.D. equals Pitch Diameter at Small End
M equals Measurement Over Large Rolls
M, equals Measurement Over Small Rolls

FORMULAS

Cot
$$\frac{\sigma}{2}$$
 equals $\left(\frac{M-M_1}{2}+r-R\right)\div(R-r)$

P.D. equals
$$M - \left(D\left(1+\cot\frac{\alpha}{2}\right)+2e+G-2g\right)$$

e equals
$$\frac{E}{\text{Cos A}}$$
 equals correction for E g equals $\left(\frac{W}{2}\right) - \left(\frac{W}{2} \times \text{Cos A}\right)$

g equals
$$\left(\frac{W}{2}\right) - \left(\frac{W}{2} \times \cos A\right)$$

SUBSTITUTION OF VALUES FOR FORMULAS 1/4 × 18 NPT .47739 P.D. at small and

EXAMPLE I: TO FIND a and A

If: M equals 1.387419 M₁ equals 1.133454 E equals .050

G equals .04810 D equals .3750 d equals .2500

W equals .03207 Then:

en: 1.387419—1.133454 +.125—.1875÷(.1875—.125) equals

1.03172 equals Cot 44° 6" 18' equals a

90°-88° 12" 36' equals 1° 47" 24' equals A

EXAMPLE II: TO FIND P.D.

If: M equals 1.387419

2e equals .10005 G equals .04810

Cot $\frac{a}{2}$ equals 1.03172 2g equals .000016

1.387419- .375 (1+1.03172) + .10005+.04810

-.000016 equals .47739 equals P.D.

Bendix photos and drawings

Below: Setup for measuring NPT master thread plug gage illustrates simplification of a complicated gage inspection job. This type of inspection is being done in Bendix plant by unskilled employees.



to fill a need for the inspection field in general.

The method described here was selected after a period of trying several techniques from the time when the tapered pipe thread was put into use through the rigid service period. One fact is imperative to its success, and that is that exact measurements of the thread plug and plain taper plug gage be known. A comprehensive outline of requirements can be found in the current government specifications for taper pipe threads.

An outstanding feature of the Bendix division's method is that it provides a means for checking the points on the gage where wear occurs most. In application, the method is comparatively simple, practical and extremely accurate.

Though the technique, including formulas, can be used to check gages for other standards, the descriptions and examples offered here pertain to the American National Pipe Thread (NPT), having a taper of 3/4" per

foot. By substituting figures relative to specifications of standards other than the NPT, the desired results can be obtained. It is for this reason that formulas for establishing the measurements are set forth in steps rather than by means of calculated constants.

Mathematical calculations have been restricted to trigonometry, so that no barrier exists to prevent the establishment of the method as general shop practice.

CHART FOR EASY CHECKING

Naturally, if a quantity of this type of gage is to be checked, a chart can be developed which will indicate the measurements with tolerances for each increment to be checked. In this way, easy reference is provided as well as a means for individuals not fully familiar with the mathematics involved to perform the work.

Concerning equipment used to obtain the necessary measurements, the degree of accuracy will of course be

dependent upon the selection. It is possible that the desired results may be obtained by a competent inspector using a micrometer caliper. However, measuring machines of recognized quality are used regularly in the Bendix plant by relatively unskilled employees. This has been made possible by the simplification of the inspection procedure, an inherent feature of the method, eliminating the "human element" to a large degree.

The gaging of internal and external threads is comparatively the same except that plugs are used to check internal threads and rings are used to check external threads. The fundamental gages involved are:

External threads—L₁ and L₂ thread gages, and a truncation gage (6 step)

Internal threads—L₁ and L₂ thread

plug gages and truncation plug gage (6 step)

However, to prevent confusion, only internal threads and their gages will be considered for illustration.

To obtain the desired check on the

B STEP BASIC THREAD MIN. TRUNCATION BE STEP BASIC THREAD MAX. TRUNCATION

APPLICATION OF 6-STEP PLAIN TAPER PLUG GAGE (NPT)

 The illustration above indicates the MINOR DIAMETER to be BASIC, providing the trial of the NPT THREAD GAGE indicated the thread SIZE to be BASIC.

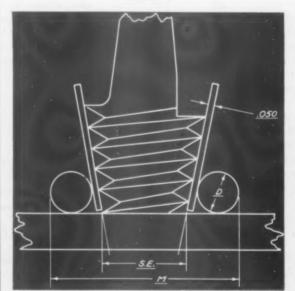
If the GAGE entered the part deep enough to allow the Bt step to be FLUSH, it would indicate MAXIMUM TRUNCATION, provided the THREAD was BASIC.

When the THREAD is BASIC, the MINOR DIAMETER may check between these two steps.

The steps on the 6-step plain taper gage have a definite relation to the condition indicated by the NPT THREAD GAGE, illustrated as follows:

THREAD PLUG GAGE	PLAIN TAPER GAGE
Basic Step	B — Br
Min. Step	Mn-MNt
Max. Step	MxMXt

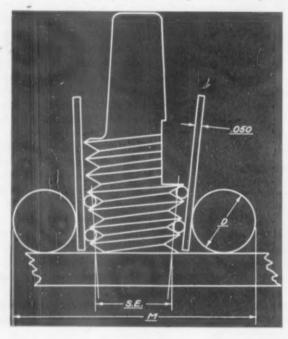
FIGURE 3.



SETUP TO BE USED ON MEASURING MACHINE FOR CHECKING MAJOR DI-AMETER AT SMALL END OF NPT THREAD PLUG GAGES

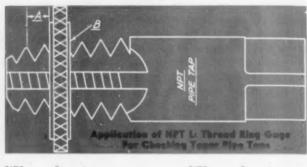
	JOR DIAM	ETER	D		A
Size	Li	Lo	Roll	Li	Lx
1/a	.3902	.3775	.250	.99818	.98548
1/4	.5163	.4984	.250	1.12428	1.10638
3/6	.6509	.6330	.250	1.25888	1.24098
1/2	.8092	.7856	.250	1.41718	1.39358
3/4	1.0184	.9948	.250	1.62638	1.60278
1	1.2762	1.2466	.375	2.13816	2.10856

FIGURE 4. Measuring Machine Setup For Checking Pitch Diameter At Small End (S.E.) of NPT Thread Plug Gages



PITCH DIAMETER			D	6	M		
Size	Lı	Lx	Roll	Wires	Li	Ls	
1/8	.36351	.3566	.125	.02138	.74960	.74269	
1/4	.47739	.4670	.250	.03207	1.13347	1.12308	
3/8	.61201	.6016	.250	.03207	1.26809	1.25768	
1/2	.75843	.7451	.250	.04124	1.42827	1.41494	
3/4	.96768	.9543	.250	.04124	1.63752	1.62414	
1	1.21363	1.1973	.375	.0502	2.15089	2.13456	

FIGURE 5.



SIZE	В	A		S	IZE	В	A	
1/8 27	.180	XX	.112	1/2	14	.320	XX	.214
1/4 18	.200	XX	.166	3/4	14	.339	XX	.214
1/8 27 1/4 18 3/8 18	.240	XX	.166	T	111/2	.400	XX	.260

A equals MINIMUM projection of tap EXCLUDING chamfer. 8 equals \mathbf{L}_1 length of ring gage.

threaded part, the L₁, L₈ and truncation plug gages must be used in conjunction with one another. They bear a direct relationship. The L₁ thread plug gage checks the upper portion or the normal length of engagement by hand between external and internal threads. The L₈ gage checks the lower portion, the taper and the effective length of thread.

The normal procedure is the application of the L₁ thread gage, noting the position of the gage notch, the tolerance being plus or minus one

turn, followed by the application of the truncation gage. This gage bears a direct relation to the L_1 thread gage also. The relation of the steps on the truncation gage to the notches on the L_1 thread gage is explained in Figure 2.

Figure 1 illustrates the setup for measuring the taper and pitch diameter of the thread plug gage. By eliminating the thread wires and omitting the values for G and g in the equation, the major diameter of the thread plug can be measured. It is

apparent that diametral measurements are for the small end of the gage. In that the degree of taper has been established, diameters at other specific points can be determined as being equal to the diameter at the small end, plus the ratio of taper times the distance from the small end.

Figures 3, 4 and 5 originated as bulletins issued to various Bendix departments involved in inspection of the tapered pipe thread. They illustrate simplicity of the method's application in shop practice. The END

Regrinding Lathe Arbor Centers

•MR. THOMAS J. LYNCH, tool grinder for 20 years in the East Springfield Works of the Westinghouse Electric and Manufacturing Company, recently suggested the following method of regrinding and salvaging centers on lathe arbors.

A simple steady rest and clamping fixture, mounted on an internal grinder, is all the necessary equipment that is needed.

On one war production job, where over 400 size .6285 lathe arbors were in constant use, 24 hours a day, on a very close tolerance qualifying operation, it was necessary to find some method of reclaiming arbors when

the centers became worn. A block with a 60° center was mounted on the face plate of the grinder with a suitable strap clamping device to hold and drive the arbor at the same time.

The arbor is mounted in the center of this block, with the other end held in the steady rest that is designed especially for the internal grinder. The grinding is done with a quill-type wheel, Grade 3880-H, mounted in the head. The wheel is dressed with a vince-type diamond dresser that insures the accuracy necessary for the job.

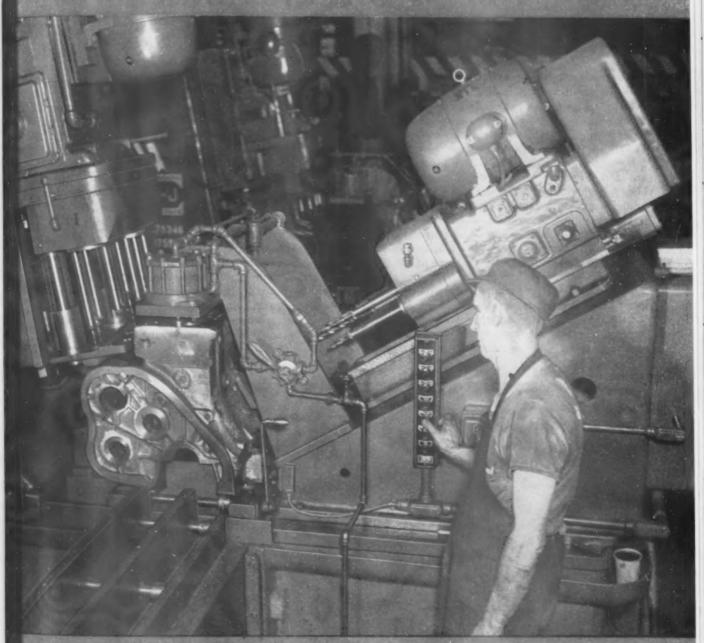
With the work mounted in the

steady rest and the wheel dressed to a 60° angle, the machine is operated in a manner conventional to internal grinders. Due to the sharp point on the wheel, the cut should not be forced. Care must be used to apply the wheel to cut on one side only.

This fixture has been used on several different sized arbors, and can be adapted to numerous similar tool jobs. Over 800 arbors have been reground in this manner, two and three times the number previously handled. The saving of valuable tool hours in getting tools back on the job without delay has made this application unusually worthwhile.

PRODUCTION

MACHINE AND TOOL ENGINEERING



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Drilling 10°, 14° and 30° pads on sides of Mack cylinder block.

MASS PRODUCTION LINE TOOLED FOR FLEXIBILITY

International-Plainfield Motor Company produces Mack diesel and gasoline engines to any of several specifications, using a single line for output of most parts. Some fixtures are adaptable to handling as many as 15 designs of the same part

THE TOOL ENGINEER

Streamlined Froduction

Mass Production Line Tooled for Flexibility

SPECIAL FEATURE BY THE EDITORS

Through highly versatile machine and tool engineering, International-Plainfield Motor Company produces parts for several models of Mack diesel and gasoline engines by single line production methods. From production of the cylinder block to rocker arms, its plant at Plainfield, New Jersey, is equipped to mass manufacture engines to any of several specifications. Not only are there differences between diesel and gasoline engine blocks, but for each of these there are variations in cylinder heads, manifolds, crankshafts, and other parts.

Yet for output of most parts, only one line which can be changed over within a few hours, is required. Fixtures are in use which have been designed to handle from three to

15 different sizes and shapes of the same part.

In all probability, tool room costs to produce one jig or fixture, where two might ordinarily be required, are not a factor. But in machine and tool engineering, where methods, techniques, and production development originate, considerable manhours and ingenuity are invested to streamline the manufacturing operation. The return on

the investment is realized in production economy and in product quality. The value of designing a highly complex fixture or tool is proven in the simplicity with which that fixture or tool works, how much it cuts the skill requirement on the production line. Mack production engineers succeed by pouring talent into design and saving need for it in the plant.

Fixtures are designed to reduce to a minimum the number of loose parts which must be maintained in stock or near the machine for fixture adjustment. As much as possible, the same components are used in each setup, change-over being made by moving them from one posi-

tion to another.

Several machines are also adjustable to varying production requirements. Though special machines are used widely, many of them can be subjected to alteration. To a limited extent, alternate machines are provided in one or two lines, where a variation in operational requirements exceeds the possibility of designing fixtures or tools of sufficient flexibility.

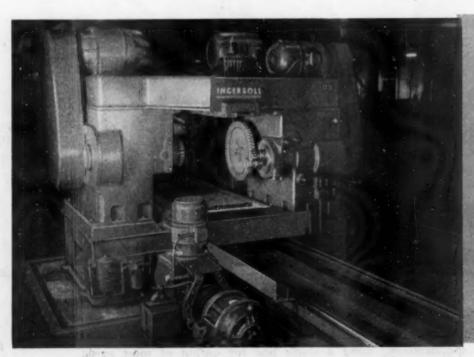


FIGURE 1. Cutters located on top and sides of bridge type milling machine multiple mill bearing locks, pan surface and top of block.

Two small adjacent cutters, which machine bearing locks, are geared to same spindle. This permits adjustment to maintain width of cut after grinding the tools.

International Plainfield photos and drawings

there was

This particular Mack plant is not modern in construction. Yet through economy in floor space, application of conveyers, and reduction of in-plant trucking to a minimum, few obstructions to streamlined materials and parts handling are apparent. Departments are generally integrated so that movement of parts in process is well localized. Finished parts need only be moved to the final assembly floor, which is central to the plant. To establish such a manufacturing technique in a somewhat outmoded building is a tooling achievement, for credit must go to development and application of modern equipment, or to design of ingenious fixtures and accessories where it has been necessary to maintain older machines in service.

Line changeover, following a run of from one to three days usually, takes from 3-1/2 to four hours. Generally, the man on any particular machines or cluster of equipment is capable of changing his tools and fixtures.

Most machining involves removing metal from cast iron or steel forgings. Carbides have been applied to speed operations, but, as with certain other companies using standard spindle power, the cutting speeds have not been advanced as much as feeds. On castings, where 1/8" to 3/8" may be removed between rough and finish cuts, better production and longer tool and machine life result from increasing feeds in proportion to speeds.

Because of the nature of peacetime manufacturing problems, Mack production engineers find tooling for war no more difficult than that to which they are accustomed. Frequently, engine designs produced for special jobs are tooled experimentally. Expanded customer requirements may then necessitate a second stage in tooling, to take advantage of economies which increased production permits. With broad acceptance of such an engine design, first class tooling is installed to obtain high production.

Evidence of this experience, and of ability to analyze manufacturing problems expertly, is shown in this article which considers production methods, tool and fixture design, and plant layout.

CYLINDER BLOCK LINE

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FIGURE 2. Side and face milling the bearing locks on the cylinder block. One of two catters which can be adjusted to compensate for loss of size in grinding is shown. Cutters pivot around a bearing to permit accurate adjustment to width of cut.



I MPROVEMENTS IN MACHINE and fixture design, including application of faster machining cycles through the use of carbide-tipped cutting tools, has cut the cost of producing cylinder blocks for diesel and gasoline engines approximately 30 per cent.

Cylinder block production is divided, with two types of large blocks progressing through the same production line and a smaller block moving down a separate line. Practically, the only difference between the larger blocks is that of the bores, which vary 1/4". The diesel is provided with a sleeve in the sub-assembly.

MULTIPLE MILLING OPERATION

First machining operation on the larger type block consists of multiple milling on the pan surface, the bearing locks, and the top surface. Provision of two sets of cutters in line on the same machine permits taking rough and finish cuts in a single pass. Table travel is of sufficient length so that two castings can be loaded for machining in the same cycle.

A bridge-type milling machine, with cutters located on top and sides is used (Figure 1). A particularly ingeni-

ous tooling application provides for strict control of accuracy in finish milling the bearing locks. In that both side and face cutting is performed, it is essential that the width of cut be held closely. To compensate for loss of size in grinding to sharpen cutting teeth, two cutters of equal diameter are mounted side by side and are geared to a single spindle quill in such a manner that they can be pivoted around a bearing. (Figure 2). The cutters are set so that a line through their centers is at an angle with the direction of table or work travel. Compensation for reduction in cutter diameter following grinding can be made by closing the angle toward the perpendicular to the direction of work travel.

ADJUSTABLE DRILLING FIXTURES

Previous to the installation of the special Ingersoll machine, all cylinder blocks were rough and finish machined on the same equipment. The machine was adjustable to the requirements of different size blocks. Insertion or removal of spacer blocks raised and lowered the bridge and columns. Cutters on the bridge could be traversed to proper location for each block. At present, the old ma-

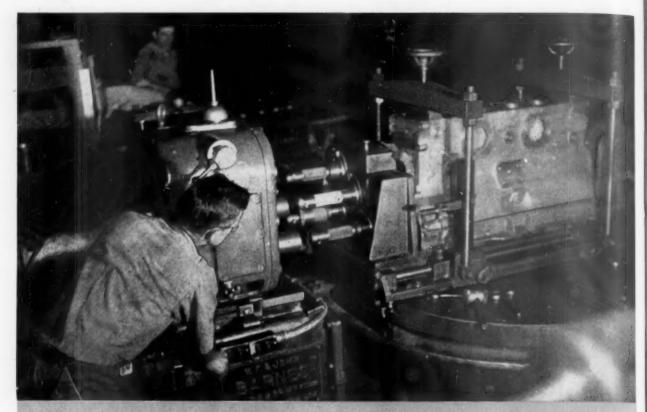


FIGURE 3. Finish hering line bearings for crankshaft, camshaft and auxiliary shaft and compressor on diesel block.

Rough boring is performed on separate head, the work indexing to the head shown for the finishing operation.

chine is used for the smaller block.

Following the first milling operation, blocks proceed through a series of drilling and reaming operations, with one operator devoting his attention to a cluster of machines. In multiple drilling on the pan surface, two process holes are also drilled and reamed for location of the block in future operations. For this job, a Vee locator is used on No. 2 and 5 barrels. All blocks move through this setup, the jig being raised or lowered to suit block heights by insertion or withdrawal of heavy U-washers between the jig plate and stop collars on corner guide posts.

The multiple spindle head and the jig plate afford complete provision for every type of hole pattern on the various blocks. To guide the operator in tool setup, a template covers holes in the jig plate not required for a particular job, indicating in which spindles tools will be inserted. This practice is followed in all multiple drilling operations where more than one hole pattern is involved.

BENEFITS FROM HIGHER SPEEDS

In milling the ends of the cylinder block, another Ingersoll bridge-type machine is used, mounting cutters at both sides. Six cutters in all are used. Chief difference between a newer type machine which has been applied to this job and an old machine (which is still used on smaller blocks) is the application of carbide-tipped cutters which have permitted use of greater machining speeds.

Where the older machine produced 2-1/2 blocks per hour, the newer model produces six. As is well known, the average type of machining operation usually does not reflect fully in production time the faster cutting speeds in

that a relatively small percentage of floor-to-floor time is actually involved in removing metal. However, Mack production engineers have designed and developed fixtures which permit rapid loading and unloading of work, so that a high percentage of time is devoted to actual production of chips.

As with the entire engine production line, the cylinder block line is completely conveyerized. Process storage space is afforded on the conveyers so that the minimum bank of parts ahead of any machine involves at least one hour's production.

CARBIDES INCREASE OUTPUT 750%

Stud holes are drilled on a multiple spindle setup, with the block indexing following drilling one half the top surface for drilling of the other half. Two heads are assembled to each block, each having the same hole pattern, so that the same machine and jig can be used to complete the operation.

In drilling oil holes of more than 13" length in the block —5/16"—an automatic machine is used. Parallel to the spindle are stationary rails permitting vertical adjustment of stops to control spindle advance and feed. Chief feature of the machine, though, is provision for automatic spindle withdrawal for chip clearance when resistance or tool pressure becomes too great.

Crankshaft bearings are milled by feeding the work down against a gang setup of 13 cutters, mounted in line. With carbide cutters, output has been increased from 2-1/2 pieces per hour to 19.

Rough boring crankshaft, camshaft, auxiliary shaft and water pump bearings is performed from a single head, necessitating indexing the work to a second head, for a finishing operation (Figure 3). When installed, production did not warrant development of a 2-way machine. However, considerable versatility has been incorporated in that all blocks are put through the one machine, spindles being provided for every type of operation. Only tool changes, and raising or lowering the work holding fixture to correspond with specified spindle centers are required to convert the setup for boring different blocks.

FIXTURE COMBINES OPERATIONS

A complicated fixture and tool design, covering two operations has paid its way by providing simple work and tool setup. The job consists of grooving crankshaft bearing surfaces in the cylinder block and bearing cap, and notching one lateral edge of the block bearing for the snap-on bearing lock. Though the operations are separate, an integration and economy of movement is obtained in that both operations are performed with the one work and tool setup. Neither the work setup, nor adjustment of the fixture for the second operation, call for skill on the part of the operator. Further, fatigue is reduced to a minimum, considering the size and weight of the work and boring bar which are involved.

The oil groove is bored in the middle of the bearing

Streamlined Production

obviously, must be concentric with the axis of the boring bar. Neither the angle, nor the fact that bearing caps are bolted in place, affects this boring operation. However, it is the single factor which permits cutting the snapon bearing lock, or notch, in the second operation.

To bore, or cut the notch, in one edge, bearing caps are removed and the block is moved to one side and back. Lateral movement locates the groove properly on the edge. Backward movement withdraws all of the block bearing surface, except a segment of the upper surface from the range of the cutting tools. These two directional actors are provided for in a single diagonal movement of work in the fixture. (Figure 6).

Movement of the work in the fixture is obtained by a conventional worm gear mechanism, with the worm shaft and the rails in the fixture base trued to the angle of movement. The fixture base, upon which the sliding fixture members and the work move to the second position is bolted to the machine carriage.

Feed of the carriage toward the machine head-or bor-

FIGURE 4. Boring oil groove in bearing with bearing cap boited on. Cap is removed for next operation.

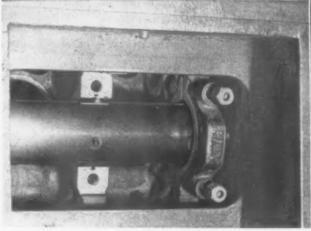
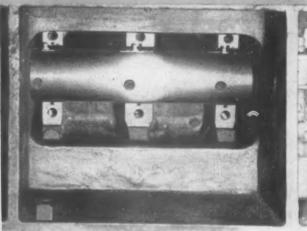


FIGURE 5. Work is moved diagonally in relation to boring tools for notching bearing snap-on lock.



with the bearing cap bolted in place, to a depth of ½". Caps are then removed (Figure 4), fixture adjustment is made, and a notch is cut in the block bearing surface on the lateral edge, parallel to the oil groove (Figure 5).

In order to perform this operation with the same boring bar setup, it was necessary to take several factors into account in designing the fixture. Most of these factors pertain to placing the work in the secondary position with relation to the position of the boring bar, as set up for the first boring operation. Complete contact with the work is, of course, required for the first operation, whereas only partial contact is required for the second.

Considering the entire operation with respect to the bearing surfaces on the cylinder block only, the block rests on its side, but at an angle, so that one lateral edge of the semi-circular bearing surface is above and in front of the other edge. In boring grooves, the entire bearing surface,

ing head in this instance—results in feeding the boring tools into the work, for the grooving operation.

The boring bar consists of two sections which revolve together, but which permit one member to slide laterally within the other (Figure 7). The sliding action results in tool advance. More particularly, one section of the bar carries the tools, and is locked in the work holding fixture by a flange or collar turning between thrust bearings (Figure 8). It moves forward with the fixture toward the spindle and back. The outer section of the bar, or sleeve, is keyed to and thus revolves with the inner section, but it maintains its position with relation to the boring head, so that as the carriage moves toward the head, the sleeve moves into the fixture. Formed slots or cams in the sleeve, guide tool actuating pins which are part of the inner bar mechanism. As the pins ride through the cam slots, the tools are fed into the work and withdrawn. Two cam

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Streamlined Production

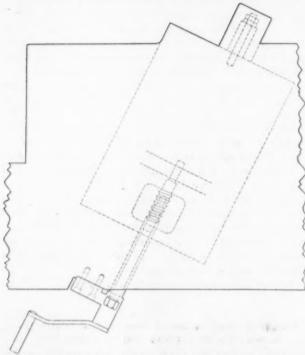


FIGURE 6. Fixture for combined boring and notching of bearings is moved diagonally by screw mechanism in base. Fixture is secured to the machine carriage.

patterns are provided, one for three of the tools and the other for the remaining four, so that first one group of tools feeds into the work and then the other before the grooving operation is completed. The reason for this is that the entire load would be excessive for the equipment used on the job.

The sleeve is advanced into the fixture (actually the fix-

ture moves against the sleeve; though whether carriage or head moves does not affect design) against spring pressure and toward a positive stop. Upon completion of movement, the entire row of tools have advanced into the work and been withdrawn into the boring bar. At this point, the work is shifted for grooving—without returning the carriage—the snap-on bearing locks. Table travel is reversed and the spring forces the sleeve back out of the fixture, causing the cam followers to retrace their path, feeding the tools out and in again.

MULTIPLE DRILLING SETUPS

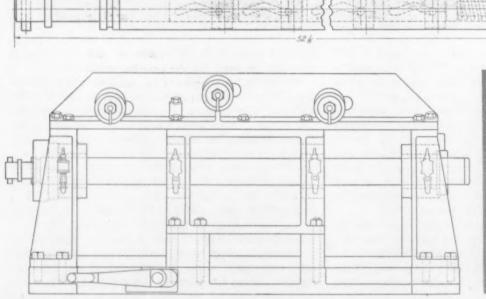
A multiple drill setup is used to drill 12 valve guide holes. Because these holes are machined at 1-½ off the center line parallel, the work is mounted at this angle in the base. A bar with bushed jig holes is inserted through the camshaft hole to guide the tools. A relieving locating pin, offset from the end of the bar, is inserted in the main crankshaft bearing to assure location of the bar at the correct angle. Plugs in the cylinder bore locate the block at the proper position.

Drilling operations which do not lend themselves to multiple spindle setups or special machines are cleaned up on six radial drilling machines. To some extent, this type of work is done to provide for custom specifications. Tilt-tables are used to facilitate work handling.

INSERTING BORING BAR FOR GROOVING

For finish boring of the crankshaft bearings, bearing caps are bolted in position. So that cutters will clear the work when the boring bar is inserted, without removing the bar from the machine spindle, the work holding fixture is raised from location 1/4," by small cam-actuated jacks, and the bar is inserted in an off-center position. With the bar inserted, and with tools clearing the edge of each bearing, the work is dropped to rest on locating surfaces which assure proper control of the distance between the top surface and the bore centers. Bosses in process holes locate the work with respect to end and side dimensions.

Locating from the bearing bore, the ends are finish



Above: FIGURE 7.
Sliding action of boring
bar within sleeve acts
to feed tools by means
of pins riding in formed
slots or cams.

Left: FIGURE 8.
One section of baring bar is lacked between thrust bearings in the fixture. Fixture secured to lathe carriage advances toward headstock to feed tools.

milled, to assure perpendicularity of this surface with relation to the crankshaft.

Bores are then honed, with locating plugs and tools interchangeable for the various sizes of blocks. When the thrust bearing is faced square with the shaft bore, the final operation has been performed on the gasoline engine cylinder blocks. For this operation, work is located from the main bearing cap. A boring bar with facing tools which disappear for bar insertion has been designed for actuation similar to that described for grooving the bearings. As the work feeds against a sleeve, tools are actuated to advance across the face of the thrust bearing. Spring pressure returns the tools to the withdrawn position as the carriage returns.

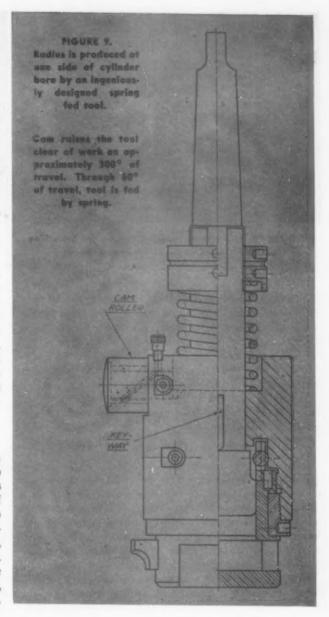
INTRICATE MILLING PROBLEM

Diesel engine blocks are counterbored for insertion of cylinder liners or sleeves.

A special machine has been applied to milling valve lifter and fuel pump pads. Valve lifter pads extend across the upper half of the block, whereas the fuel pump pad is adjacent to an obstruction which prevents a complete traverse on single spindle equipment. Because of this, the valve lifter pads are machined by a 2-spindle head, with the spindles in series. Simultaneously, the fuel pump pad is machined by a single spindle, lying beneath one of the other spindles. The carriage thus traverses half the length of the cylinder block to complete the entire operation.

SPRING FED TOOL

A radius is produced at one side of the cylinder bore on the smaller gas models to break down an edge adjacent to valve holes and prevent fatigue cracks. An ingenious tool is used, combining spring feed with cam control of cutter contact. (Figure 9). The cam lifts the tool to clear the work on approximately 300° of travel. Throughout rotation, however, the tool is under spring pressure, and through 60° of travel is fed by the spring into the work. Depth of cut is controlled by the ratio of cutting pressure to spring pressure. The spring feeds the tool to a stop, which is set for the depth required on the finished piece.



CONNECTING RODS AND ROD CAPS

BOTH ANGULAR AND STRAIGHT connecting rods are manufactured for diesel and gasoline engines produced for Mack. Though sequence of operations is fairly conventional, flexibility in fixture design has been requisite to economical use of equipment and floor space.

Locating pins and blocks are adjustable on many fixtures to account for variations in size and length of the different types of rods which are machined.

For example, in drilling and reaming wrist pin holes, the small end of the rod fits against a V-block, and a second location is obtained by dropping the crankpin hole over a plug. Various sizes of plugs are available for insertion in the fixture base at the proper distance from the V-block.

In broaching crankpin holes on the rough forging, the parts are machined on double slide equipment, with tools operating alternately. Two station indexing fixtures (Figure 10) for each tool permit loading during the machining operation, the part being indexed to working po-

sition during the return stroke of the tool. Because rough boring is performed before the cap is severed from the rod body, the fixture is developed to produce an oblong hole in order to compensate for the 3/16" of material lost from each side of the rod in sawing the cap from the body.

One of the most ingenious machine and fixture combinations is applied to drilling bolt holes in any of six models of rods and caps. All combinations of work dimensions are accounted for by three adjustments of locators, and three alterations in spindle and jig plate bushing positions. Fixture development and design shows attention to an economy of production factors, simplifying work and tool setups, and maintaining a minimum of loose fixture parts. Both manhours and machine time are used to the fullest in actual metal removal.

Though the rods and caps are not aligned in assembled order, both are drilled in the same setup. An 8-spindle drilling head is used to machine two sets of workpieces simultaneously. The work holding fixture is designed so



FIGURE 10. Two station indexing fixtures for breaching crankpin holes on double slide equipment.

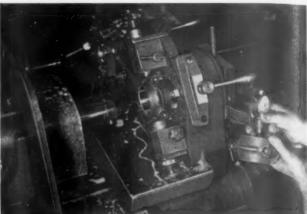


FIGURE 11. Bering wrist pin and crankpin heles on mechine which can be adjusted for head spacing.

that work is located against three surfaces. The faces of the rods and caps bear individually against a permanent block which refers to the distance between the face and bolt hole centers. Dimensions of the work are such that the larger rods bear against relieved edges in the block, clearing a step which is used as a reference on the smaller rods. Only two references or locating surfaces are required for this particular dimension in that there are only two variations in the distance between the faces and hole centers for all six models.

SHIFTING DRILL SPINDLE CENTERS

Location of side or edge surfaces, which vary in accordance with the diameter of the rod bearing, is obtained by the use of locator blocks. One side bears against a block which also serves, on its other side, to locate one side of the rod cap. The opposite sides of both the piston rod and the rod cap are located against blocks which can be pivoted so as to present any of three locating bosses, depending upon the dimension of a particular rod or cap.

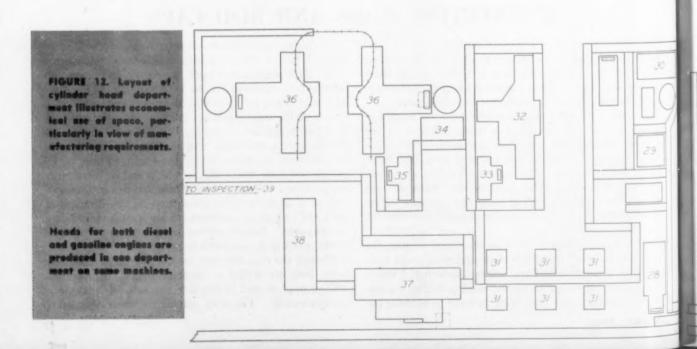
With different work and work locating setups, different center spacing is required for drilling spindles and jig plate bushings. Both spindles and bushings are actual-

ly moved to obtain proper spacing. In that there are three sets of hole spacing, this requirement has been satisfied by determining the common center of the three points. With power to drive spindles in all positions derived from the common center, the spindles and bushings are pivoted from one position to another around that center. By means of gears, all spindles are moved simultaneously to the various positions, assuring correct setup.

HOLE SPACING WITH ONLY TWO SETUPS

A similar fixture is used to drill bolt holes in cylinder block bearing caps. Only two setups are required for hole spacing. Work location, however, requires provision for six different locating surfaces with regard to the width of the bearing. These surfaces are provided by a block with flats ground tangent to six different radii. The block is turned to present the required locating surface by a hand knob and shaft.

In another instance of machining the connecting rods, a 2-spindle Heald Borematic is made adjustable so that one of the heads can be traversed in accordance with change in length of the rods. The machine is used to bore bearings at both ends of the rod (Figure 11).



PLANT LAYOUT

HOUGH BUILDING DESIGN of the Plainfield plant leaves much to be desired, in view of the weight of the product and the equipment required to build it, production engineers have intelligently solved many problems by skillful utilization of modern equipment and conveyers. Streamlined production and parts flow has been achieved despite awkward space distribution. Though manufacturing floors tend to be crowded, high production is maintained. Further, some of the crowding is attributable to the highly worthy purpose of extensive conveyer lines which provide process storage space and diversion areas which serve well in view of current deficiencies and occasional equipment maintenance problems.

Improvements have been made in step with production increases, which is in keeping with the modern conception of mass manufacturing, wherein savings from stream-

lining are more fully realized in higher output. As output has warranted installation of special design equipment, plant layout has benefited through shortening of production lines. The use of such processes as induction hardening has permitted consolidation of production sequence, eliminating in this instance the need for transportation of parts to the heat treat room.

The plant consists of a single story section fronted by a four story building which is divided into three "wing" sections. A good manufacturing balance has been achieveed which results in holding in-plant trucking of semiprocessed parts to a minimum.

The large single floor section is used for the heaviest

CYLINDER HEAD MANUFACTURE — SEQUENCE OF OPERATIONS

- Mill top and bottom
- Drill locating holes
- Drill water holes
- Mill both sides
- Pipe plug cored holes
- *Rough bore air cell holes
- *Finish air cell holes
- *Water test air cell holes
- 9. *Rough bore comb. chambers
- 10. *Profile mill comb. chembers
- *Rough drill injection holes
- 12. *Finish ream injection holes
- 13. *Mill top clearences
- *Operation on diesel head only
 **Gasoline head only

- 14. *Drill small injection holes
- 15. *C'sink small injection holes 16. Multiple drill stud holes
- 17. Drill, bore, ream and face intake
- and exhaust valve holes
- 18. Multiple drill push rod holes 19.**Multiple drill spark plug holes
- 20. Multiple drill exhaust manifold side Multiple drill intake manifold side
- Multiple drill intake lifter bracket
- holes
- 23. Multiple bore push rod clearances
 24. C'bore for valve springs
 25. Drill oil holes

18

C'sink and tap valve bracket holes

- C'sink and tap exhaust manifold side
- C'sink and tap intake manifold side
- Water test oil line
- Water test stud holes
- Bench work
- 32. Grind top
- Face intake valve seat
- Drive valve guides
- Ream valve guides 36.**Finish mill for correct comb. chamber
- Wash
- Assemble exhaust valve inserts
- 39. Inspect

Numbers on machines in layout plan tally with numbers on chart of sequence of operations above. Operations from 6 through 15 are performed on diesel heads only. Note the layout of this section within dotted line on drawing.

Operations 19 and 36 are performed on gasoline engine head only, and are by-passed by diesel heads. Machines marked 17 process both intake and exhaust holes. One machine is tooled for combined operations, others work on single jobs.

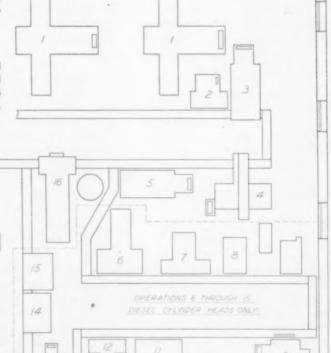




FIGURE 13. Rough and finish milling top and bottom on cylinder head. Heads can be varied in height to meet specifications on combustion chamber. This is a final operation, permitting standard handling previously.

work. One end is filled with a battery of automatic screw machines—42 four-spindle and eight single-spindle units. The remainder of the section is used for machining the cylinder block and crankshaft.

Final motor assembly is centralized on the second floor of the center four story section. Parts feed to this department by truck and conveyer, and move from there directly to the second floor of the adjoining "wing" for testing and then to the ground floor for shipment.

Departments manufacturing such parts as flywheels, connecting rods, gears, camshafts and small parts are well localized, each on one floor and within one section or less.

CYLINDER HEAD MANUFACTURE

Cylinder head manufacture is performed directly beneath the final assembly floor. The layout of this department which manufactures for both diesel and gasoline engines, serves to illustrate the space economy and machining flexibility which has been generally achieved throughout the plant. (Figure 12).

A total of forty operations is required to produce both styles of heads. There are 28 operations which are performed on both styles, 10 operations which are performed on the diesel head but not on the gasoline model and two operations which are performed on the gasoline model but not on the diesel.

The department has been laid out in such a manner that heads scheduled for gasoline engine assembly bypass a loop through which diesel heads are processed. This consists of a sequence of 10 consecutive operations.

FLEXIBILITY IN FIXTURES

Throughout machining, flexibility in tooling has been achieved by equipping fixtures with two sets of locators, including locating pins which can be transferred from one position to another. To satisfy special customer requirements, minor modifications may be performed on any particular head at the end of the line. Most variation occurs in the size specified for the combustion chamber on gasoline engines. This is regulated by the distance between the top of the chamber and the bottom surface of the head. However, production efficiency is not affected. All cylinder heads are maintained at the same height throughout the first 36 operations. Operation 37 consists of finish milling to produce a combustion chamber of specified volume (Figure 13).

CRANKSHAFT LINE

A PPLICATION OF MULTIPLE TOOLING on automatic machines and installation of induction hardening equipment has been responsible for impressive production savings in crankshaft production.

At one time, the shaft was rough turned in a department located adjacent to the heat treat room. It was necessary to move parts to the heat treat room, and then to another floor for finish machining. Installation of induction hardening permits rough turning, hardening and fin-

ish machining in a continuous line setup.

Further savings resulting from the modernized hardening setup include reduction in runout because of decreased internal stresses which were caused by a lack of uniform treatment. Following tempering in a small production furnace, runout does not now amount to more than .015", whereas it once varied between .050" and .060". Not only does this mean less work on the straightening press, from the manhours angle, but it may well mean

elimination of slightly injurious results which can accompany excessive straightening work.

The induction hardening equipment is a tunnel type installation, through which parts are fed by conveyer to five stations. Three stations are set up for hardening bearings, two for pins (Figure 14). Harden and quench cycles are controlled by an automatic timer, with light signals indicating progress of the cycle to the operator. Split coils are swung into position around the surfaces to be hardened by means of arms which extend from the far side of the tunnel. All surfaces of like diameter are treated at one station, the part being indexed from one position to another on the conveyer.

INDUCTION HARDENING CRANKSHAFTS

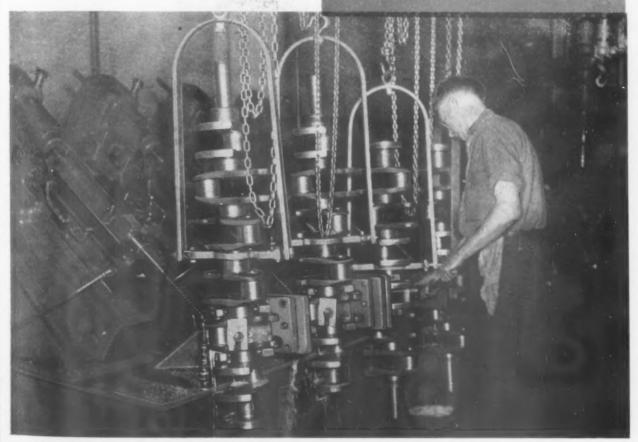
Crankshafts are fed to the hardening tunnel by roller conveyer. Previous to this, oil holes are plugged with wooden pins. Fibre discs are tacked to the pins to graduate or "taper" the degree depth and degree of hardening between the bearing surface proper and the rims of the oil holes. This is necessary to relieve the high differential in hardness between the outer surface and the wall of the oil hole, a differential which would induce fatigue cracks.

As set up now, machining procedure in manufacturing crankshafts follows methods established generally in the automotive field (Figure 15). However, as in other processing in this plant, holding fixtures for several operations must be versatile enough to take certain dimensional variations. On the line devoted to production of larger shafts for both diesel and gasoline engines, about the only difference in fixtures is in chucking, where shoes are installed to compensate for a ½" pin variation.



FIGURE 14. Induction hardening cronkshaft bearings and pins. Five stations are set up in tunnel-type installation. Work progresses from station to station by conveyer. Entire cycle is automatic.

FIGURE 15. Drilling angular oil holes in crankshaft.
Note fixtures suspended from conveyer which permit
turning shaft end for end for drilling at either end
without fatiguing machine aperator.



Streamlined Production



FIGURE 16. Conventional type of camshaft grinder is employed in typical automotive production line.

CAMSHAFT LINE

FIVE DIFFERENT MODELS of Mack camshafts are manufactured on the same equipment, in the same production line. The line is fed by the simplest type of conveyer, parallel angle irons secured to posts at a height of approximately two feet from the floor, and set 24" apart. This spacing permits rolling any of the camshafts along the line without the bearing surfaces touching the rails.

The first operation consists of straightening the forging on a power press. Dial indicators on the holding fixture check all bearing surfaces, showing the operator the amount of runout to be corrected at any point. Camshafts are straightened to .10" runout or less, and are finish machined to .0005".

MULTIPLE TURNING

The first machining operation is turning the flange end, or front face, of the camshaft (Figure 16). The part is inserted in a sleeve which takes the full length of the shaft. The sleeve is mounted in the spindle of a Potter & Johnston lathe, and serves to chuck the part at the front end and to locate its length with respect to the end bearing. A threaded plug in the end of the sleeve can be adjusted for length variation.

Multiple tooling is required to machine the steps of the flange in the single setup. By mounting an additional block beneath the regular tool block, nine tools can be mounted for operation from the cross-slide. The auxiliary block is keyed to the front of the main tool holder and is bolted in place. Two tools operate from the turret to complete the setup required to turn, face and break corners on the flange.

SMALL PARTS MANUFACTURE

Cam turning is performed on a conventional automatic lathe, with tool advance cam controlled. Alterations in cam spacing are obtained by means of insertion of blocks and spacers.

Finish grinding is performed on a Landis grinder, with

an automatic index, as illustrated in Figure 17 below.

Miscellaneous small parts are manufactured by high production methods, though strict line production is not maintained. Most grinding, for example, is centralized in a single department for two reasons. First, a grinder would not be in continuous use if setup in a line designed for output of one product. Second, centralization permits one foreman to become a specialist in this vital finishing process.

The front gear cover is one of the few stampings which is machined in this Mack plant. An efficient machine cluster, utilizing a minimum of manhours, is devoted to milling and drilling the part. Following grinding of the flats surrounding the shaft holes, the front face is milled. An unusual feature of this job is that location is obtained from the surface to be machined. This is permissible because of the preciseness with which the stamping operation is performed. The work holding fixture is built up

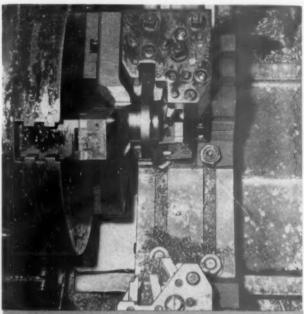


FIGURE 17. Rough and finish turning flange on camshaft. Note auxiliary tool block under standard block.

above the milling machine table so that locating points can be swung up into position for clamping of the part and then dropped clear of the cutter path.

High production methods are required to produce 12 valve rocker arms for each engine.

Most interesting operation, from a fixture design standpoint is the first, where a radius is broached on the push
rod contact. One broaching fixture is adjustable to take
several widths and angles. The basic fixture consists of securing the work by fitting the bearing hole over a central
pin. Then a threaded pin is advanced against one end of
the arm to pivot the part against a locating pin which contacts the other end. By adjusting locating holes, in and
out, and by transferring the pivot plug from one hole to
another (as provided in the fixture base), and by raising
and lowering the clamping screw by means of changing the
clamping block, the fixture can be adapted to hold four
varieties of rocker arms.

Simple Tool Inspection Method

Application of commercial "black light" method to inspection of all types of cutting tools seems particularly helpful to carbide tool users and producers. Rapid analysis can aid in locating sources of trouble in tool manufacture and grinding

Economical and efficient inbide-tipped tools has presented a
problem to tool manufacturers and
users. Pressure of war production,
scarcity and variability of critical
materials, and "thinning" of experienced personnel add to the need for
inspection. This condition is naturally reflected in production, where, for
example, failure of one of a gang of
tools results in a loss of production
time, and perhaps the scrapping of
processed material.

Magnetic particle inspection (Magnaflux inspection) has been available in many plants for production testing of high-speed tools. However, this method has little value in testing carbides, since most of the tips are not ferro-magnetic. Even if slightly magnetic, they offer much more reluctance than the highly magnetic steel shanks on which they are mounted, and consequently the magnetic field is concentrated in the shank rather than in the tip.

CONTROL OF CARBIDES

In the manufacture of carbidetipped tools, design, preparation of the shank recess, brazing, and grinding have been the subject of considerable investigation. However, establishment of procedure involving these factors has been complicated by variations in critical material going into the tool and lack of experienced personnel. Because of this, there has been need for practical methods whereby positive, economical control of processing could be maintained.

The new fluorescent penetrant inspection method (Zyglo) created interest when both laboratory research and tool users found that this "black light" method was applicable to carbide-tipped tools, and that its application was simple, rapid, economical and non-destructive. It was used at first by manufacturers of silver-plated bearings, aluminum and other nonferrous castings, moulded plastics, and even on tungsten filaments and

D. P. WALSH

carbon pump seals. That it should be adapted by such users to tool inspection was natural. Research confirmed its applicability on carbides, and also demonstrated that the method could be used with definite advantages on dies, mandrels, and steel tools.

Zyglo inspection locates discontinuities at, or opening to, the surface by means of a non-destructive fluorescent penetrant and near-ultra-violet light. It is readily applicable to practically all solid materials, is versatile in application, and is used with varying techniques for various problems. Applications described in the following paragraphs cover tool inspection in a general manner.

APPLICATION OF PENETRANT

During inspection, usual precautions in handling carbide tools should be observed. Further, tools should be dry and clean. Used, or dirty tools, should be degreased prior to inspection. Zyglo inspection consists of the following steps:

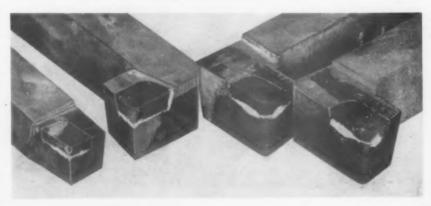
I. Zyglo penetrant, at room temperature, is applied to the part, either by dipping or by spraying. It is necessary only that the sections to be inspected be covered thoroughly with the penetrant. Duration of the dip is of little importance. The pene-

trant should be allowed to remain on the sections for a minute or two to allow time for penetration into defects and also to recover excess penetrant. With ordinary carbide-tipped tools, only the tip need be immersed in the penetrant, and draining is best accomplished if the tool is then placed in a nearly vertical position with the tip down. Sufficient penetration time is usually provided by dipping a group before proceeding further. Penetration time for steel tools varies, but in general it is longer than that required for carbides.

REMOVAL OF PENETRANT

2. Penetrant, which emulsifies in water, is then removed from all the surfaces of the tool by washing. Hot or cold water provide equally good results, though hot water dries faster. A spray or impinging effect is preferable to a slower, solid stream of water. Washing in a tank of still water is not satisfactory since the water soon becomes polluted with penetrant and leaves the surface of the part coated with a background of fluorescence ' which tends to detract from the vividness of indications. For carbide-tipped tools, a four-jet spray converging in a point provides practically instantaneous washing, and is preferable for tools of regular, elongated shape. For cutters and similar tools, a hand hose with spray nozzle should

FIGURE 1. Poor bond between carbide tip and tool shank indicated by penetrant developed and exposed to "black light".



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also be available. In either case, there is no danger of washing the penetrant out of cracks and similar defects.

3. Drying the part is the next operation. With cutters or parts of complicated shape, a hot air recirculating dryer has certain advantages. For ordinary tools of plain, elongated shape, the globules of water may be removed readily after dipping in the spray by pulling them through a cloth held in one hand. They can be dried completely in groups by compressed air, which also removes the lint left from the cloth and which may be. fluorescent and appear somewhat like an indication. With such an arrangement, it is desirable that the air line be provided with a filter so that moisture or oil is removed.

DEVELOPING INDICATIONS

4. Developing the indications comes next, and both wet and dry type developers are available. The wet developer has the advantage of being dustless, and is applied prior to drying the tools, so that developing occurs simultaneously with drying. While it can be used successfully on all tools, it is recommended especially for steel tools and complicated shapes. It requires that parts be dried in a recirculating hot air dryer. The dry developer can also be used on all tools, but it is generally recommended for carbide-tipped tools of plain, elongated shape. Tools are immersed in it momentarily after drying and then allowed to develop. With carbide-tipped tools, sufficient developing time is usually provided by dipping an entire group before commencing visual inspection.

Developer causes indications to form rapidly and prevents them

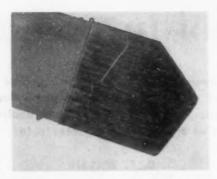
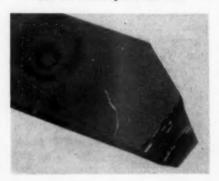


FIGURE 2a. Under ordinary light, a scratch is visible, but crack is not.

Cornell Tool photos

FIGURE 2b. Same tool as in 2a, but exposed to black light, indicating crack but not showing the scratch.



from spreading, thereby giving the inspector a better indication of the depth and extent of the defect. The developer makes the indications very vivid, and since it is not fluorescent under black light, it masks background fluorescence left by improper washing.

5. The final step is the examination of tools under near-ultraviolet or "black" light. Penetrant in cracks or shrinks brought to the surface and held by the developer absorbs the invisible black light rays and emits a vivid, yellow-green light. The result is that the inspector sees the indications rather than the part. Extremely minute cracks are found readily since their depth is generally much greater than their width, and quite bright indications will develop if sufficient time is allowed. On the other hand, tool marks and scratches are generally much greater in width than in depth, and consequently may not show at all in that penetrant is removed from them by washing. If they do show, the indications will not develop in brilliance and will cause no confusion.

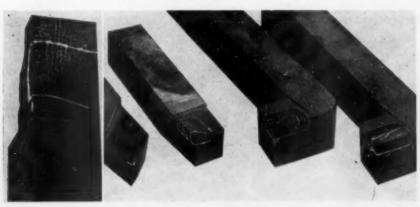
POOR BOND INDICATIONS

In the inspection of carbide-tipped tools by the Zyglo method, a slight indication at the junction of the tip and the shank may be apparent immediately. While this indication is usually irrelevant, there will be cases where the indication will grow and spread to the extent that a definite discontinuity between the tip and the shank is indicated which could cause failure either in operation or in grinding. This is generally referred to as "poor bond". (Figure 1.) There also may be pin-point indications at the bond which will grow and spread to the extent that an area of porosity or a void is indicated. This might be detrimental, depending upon its location. For example, the tool in question may be of standard shape to be reground to a special form. Then, if the porous area or void is located at the cutting edge of the new shape, or is in a highly stressed area, obviously the tool will fail. Such tools can be segregated readily and used where they will be serviceable, provided the defect is not too great.

EVALUATING INDICATIONS

Such acute examination of bond by a tool user should be qualified by an understanding of what makes a good brazed joint. It has been pointed out by tool experts that a fine, tight braze may not be the best. Brazing material is a good heat conductor, and the more brazing material there is, the better is the chance of heat dissipation. Further, the extra cushion reduces the likelihood of cracks either in initial grinding, in service, or in regrinding operations. However, it is also important that the amount of brazing material be limited. Under heavy duty service, a large amount of braze metal, which is rela-

Below, left: FIGURE 3. Large cracks and typical grinding checks shown by black light. Right: FIGURE 4. Cracked tools that must be rejected.



tively soft, may not offer sufficient support and consequently a cracked tip may result. To eliminate this and certain other conditions, including brazing strain, shims and a sandwich braze" are used. With such, under certain processing conditions, the likelihood of "poor bond" is increased, but it is claimed that a better tool is the result. Need for good inspection immediately becomes apparent. Some agreement should be reached on the locations and amount of poor bond permissible, and this can be accomplished by users keeping individual records of the lives of typical tools under actual service conditions.

Zyglo indications of cracks are readily apparent. Even the finest cracks will appear as clean-cut, brilliant lines, if indications are allowed to develop for a few minutes. Tool marks and scratches will cause no confusion, as is shown in Figure 2a, where under ordinary light a scratch is visible but a crack does not show. Figure 2b shows a crack under black light, with the scratch indicated in Figure 2a invisible. The location and direction of cracks should be given much consideration, for they may indicate the cause of the cracks, and may point to the remedy. Whether tools with cracks will be serviceable, whether they can be salvaged, or must be scrapped, are questions which the nature of the defects as indicated may answer.

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CAUSES OF DEFECTS

In the tool shop, the cause of defects conceivably might be the quality of the raw materials, or might be any one of the processing steps. Grinding operations are considered the most critical. Where there is any doubt, the logical things to do is to inspect after each operation. The cause of the trouble can then be located definitely, and steps can be taken to remedy it. This may seem like over-inspection, but it is suggested as a method which has proved worthwhile in checking small lots of tools for control purposes. Figure 3 shows large cracks and typical grinding checks such as may be discovered in processing. Such a discovery will prove valuable in saving manhours and materials, provided the experience is recorded for future use.

Its use is particularly recommended where standard shaped tips must be

roughed down to fit special shapes. In plants, this procedure as used in the centralized grinding room or tool crib would consist of inspection of the tool before and after regrinding. Such inspection should increase tool life and add immeasurably to regrinding experience.

STEP-BY-STEP CONTROL

Step - by - step control inspection need not be complicated nor time consuming. With an inspection unit setup in a centralized position in the tool shop, grinding room, or crib, various operators can make their own inspections between operations. On a control group of ten tools, for example, complete inspection could be made in about ten minutes. This method has the advantage of proving to the operator his personal abil-

a tool and the value of the part being processed. The possibility of scrapping a part of high value must overshadow the possible gain in risking the use of the tool.

If defective tools are considered for salvage, the prime factor will probably be whether such an operation is feasible and whether it will be more economical than replacing the tool. In most cases, steel shanks are readily salvagable. Salvage of the complete tool, including the tip, depends on the type, extent, and direction of the defects on or at the tip. Attempted removal of the cracked section may result, in some cases only in extending the cracks. In others, it can be accomplished by removal of vertical or angular sections. These operations will also be influenced by the characteristics of the tip. In

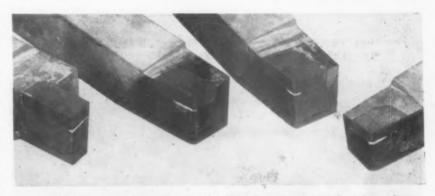


FIGURE 5. Areas of poor bond, which have little depth, may be salvaged.

ity and is considered to be educational. Experience needed for the inspection can be acquired readily, with proper instruction. In shops where production inspection is carried on continuously, the Zyglo inspector can perform similar control inspection, and his findings should be discussed with the grinding operators.

Even with excellent production or grinding control, a few cracked tools will undoubtedly appear somewhere along the line. The problem then is, "Can they be used or salvaged?" Tools such as are shown in Figure 4 must be rejected immediately. Concerning the disposition of tools in somewhat better condition, there is a variance of opinion. It is conceivable, however, that tools with cracks in certain locations, generally parallel to the principal stress, may give satisfactory service on some work. Obviously, the decision would be influenced largely by the cost of such most cases, minor porosity or shallow lack of bond in a small area can be remedied without seriously affecting the life of the tool. Figure 5 shows areas of poor bond without depth, which could be removed by radius or edge grinding. Zyglo indicates the relative depth of such areas, and provides the answer as to whether salvage is feasible.

In keeping individual records of tool life, it is frequently considered to be desirable to have transfers of the indications attached to the records. This can be accomplished by transferring the indication from the tool to the record by means of transparent tape which is weak in These indications are fluorescence. quite visible under black light, and through them the growth of defects in service can be studied. Information gained through such study would be of considerable value, affording control which should result in longer tool life and less scrap. THE END

Organize for **Efficient Production**

Abstracted from a paper by JOSEPH V. KIELB

ASSISTANT TO THE WORKS MANAGER

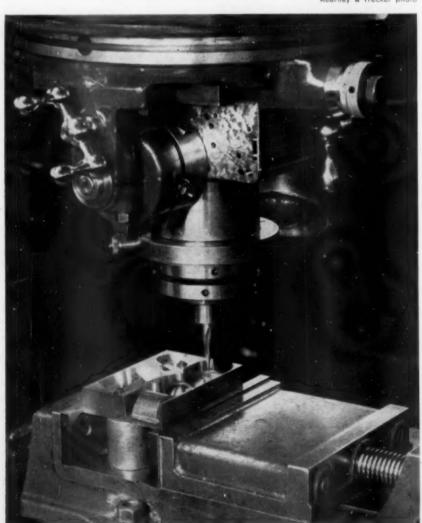
ANY INDUSTRIAL organizations have grown or expanded so rapidly that they have become unbalanced, causing lagging production, poor workmanship, and friction and complaints among workers. Yet smoothly operating plants are still an important factor in shortening the span of the war, and will be important to realizing full benefits of peace. Even though some of these plants expect to retrench, advantage should be taken of the present magnification to examine inherent flaws in the production organization.

With slight modification for individual plants-large, small or medium-a rather simple approach to the organizational problem seems applicable.

In the "front office" it is usually

Die-sinking requires good equipment, skilled labor. Highest value is realized

from a job like this when it is backed by efficient production engineering. Kearney & Trecker photo



recognized that top management should observe the line of authority in dealing with subordinates, just as subordinates observe it in dealing with superiors. Such recognition bolsters morale. Development of morale depends upon proper leadership and recognition of those who have obtained results. Establishment of definite responsibilities for subordinates relieves top management of much of the burden of details. In return, the organization must clearly show dependability and give equitable pay. Yet these principles are often ignored in the organization of production departments.

DEFINITION OF DUTIES

In the ideal organization, the minimum number of major executives report to top management. Reflected down the line, such organization reduces superficial titles, and establishes definite duties. The application of this method of assigning responsibilities to production departments is best illustrated in a definition of duties.

The production or tool engineering department has played an increasingly vital role in manufacturing organizations which have had to undergo one or more conversions. Its proven usefulness will prevail during the postwar reconversion, and in developing continued manufacturing flexibility. The production engineer studies and investigates all tooling. designing and planning. As need arises, he rechecks and revises his control on all durable equipment and perishable tools and gages. The production engineer provides up-to-date operation sheets in relation to engineering parts prints.

OPERATIONS SHEETS

Operation sheets include complete information, such as:

- Information, Su

 1. Model Number
 2. Quantity
 3. Part number
 4. Part Name
 5. Revision dates
 6. Material
 7. Department
 8. Operation Number
 9. Operation Name
 10. Machine Name

- 11. Machine B.T. No.
 12. No. machines required
 13. Feeds and speeds
 14. Durable tools and fixture
 15. Perishable tools and sates
 16. Note type of inspection
 17. Necessary approvals
 18. Hearty output

NOTE: All durables, perishables, gages whether standard or special should be given a tool hele number.

Further, the production engineering department checks and makes physical inventory of all durables, perishables and gages against engineering part prints and operation sheets. In scheduling a pilot run, the following information is then charted A smooth production operation depends upon good organization. In turn, this demands a balanced division of responsibilities. This article proposes an approach to the problem by defining the duties and inter-relationship of production engineering, production control, time study, and industrial relations

against the part to be manufactured:

- Machine Name
 Operation Number
 Tool Number
 Noo Jeces per tool
 Total tools required
 Tools now on order
 Purchase Order No.
 Additional tools
 required
 New tools required No.

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11. New tools required date
12. New Purchase Order No.
13. Date Purcase Order
Placed
14. Vendor
15. Promised delivery date
16. Date received
17. Date Inspected and
Approved

Approved 18. Inventory lists

In designing tools, the following factors are typical of those which are considered by production engineers given proper responsibility.

1. Designed tools must hold and maintain initial tolerances throughout the life of the model.

Tolerances on tools and gages must be established so that equalization of tolerances results.

3. Tools must be designed for maximum strength and miniumum weight,

4. Where possible, design jigs and fixtures for fabrication by welding, welding,

thus minimizing machining.

5. All jigs and fixtures should be designed to fit the machines noted on operation sheets. Tools must have tool hole numbers.

6. Standardization of design subprints for tools facilities standardized

MACHINE INVENTORY

A careful check list of machines by the maintenance department should be reviewed, and inventory charts should be established before scheduling production. The following information is generally recorded.

Type of machines

Number of machines and sizes

Machine maker

Minimum working tolerances and quality standard

5. Age of machine 6. Condition, whether rebuilt, reconditioned or new

7. Complete specifications such as diameter handled, speed and feeds, changes, power and space requirement 8. Ownership—Navy Defense Plant

Corporation, or company

MACHINE INSPECTION

Through periodical machine inspection reports, certain economies can be effected.

1. Prevent minor defects from becoming major repairs

2. Anticipate and plan major repairs with least loss of production

3. Establish the actual cost of maintaining equipment to determine whether scrapping is cheaper than repairing. 4. Record the condition of various

equipment

5. Arrange spare parts supply before taking equipment out of production 6. Establish a control to determine whether needed repairs were made, when and by whom

Determine the degree of interest of supervisors in properly maintaining equipment

• Production Control

In the war emergency, production control departments have proved their worth. Without control, a manufacturing division becomes hopelessly entangled in problems of scheduling, allocating materials, specifications and engineering changes.

Routine planning, scheduling, dispatching, transportation, material standards, procurement, inventory control of manufactured parts. progress recording, receiving and shipping are factors bearing on smooth production flow.

Frequently, the salvage department is subordinated to production control. However, a salvage department should not assist in scheduling production. It is the duty of the department to keep salvage and re-work at a minimum by finding and reporting production errors. This is generally done by a good manufacturing methods department, but the salvage department may often be first to correct errors. First and foremost, however, the salvage department should not become a production department with respect to depending for its existence upon correctable error.

STREAMLINED PRODUCTION ORGANIZATION IS IMPORTANT NOW

 Whether for more war production or for postwar, most production engineers face further conversion of equipment, jigs and fixtures, labor, plant layout and facilities. But not knowing what they must convert to in some cases, or when in most cases, seems to leave little room for accomplishment

There is one phase of production operations that can be attended to now, however, with assured benefit in war or peace. That is the organization of production departments to achieve an equitable and intelligent division of responsibilities. For many plants this would mean a delegation of authority where too much may now rest in the hands of one or a few men.

An open-minded approach will result in better preparation for conversion, and in smoother operation of the converted plant.

For those plants where conversion may mean no more than streamlining

the production organization, postwar planning can start now. It can be put into effect with full benefits to the war production program. For plants which must convert their entire machine and tool inventory-for more war production or postwar-preparation for such a step demands an efficient production engineering, control and cost setup.

Production preparation involves the study of applicable processes and the determination of availability of machines, tools and gages. It involves scheduling operations in the light of this study. A sound production organization is necessary to assure worthwhile results from such prepara-

In the light of present problems, involving tooling, diversification of products, costs, and industrial relations, a definition of these functions seems important to proper assignment of responsibilities. This article is intended to assist in that endeavor.

•Industrial Engineering

The industrial engineering department acts as a check on all departments in manufacturing, and should report to production management. It is concerned with methods, time study, estimating, job evaluation and job rates.

Methods engineered can be described as analysis leading toward standardization. A complete investigation is made of prospective or established processes, including a study of flow charts and operator process charts. The application of motion study provides complete data for any particular job.

The time study section operates as follows:

1. Report time study on every job

2. Establish all standards for incentive

3. Meet with labor and supervision to explain the wage plan,

4. Recommend tooling improvement through analyzed studies

 Calculate labor costs for new jobs
 Compare existing methods with alternates

7. Make factual recommendations for improved plant layout

8. Suggest possible product simplification

• Importance of Cost Control

Through good standards, incentive systems and modern manufacturing methods, estimated manufacturing cost are generally reduced in practice. The trend in cost reduction effort (particularly if bolstered by increasing sales of the product) frequently leads to a combined departmental and straight line set-up. The temptation then is to convert completely to line production. This step. however, must be weighed carefully. Extra equipment costs and safety problems increase tremendously. Accurate cost control, among other things, affords facts which leave little room for doubt when such a decision must be made.

Reliable control, further points to overloaded supervision, high percentage of inspection, overloaded indirect labor, and lagging production by poor obsolete methods.

• Industrial Relations

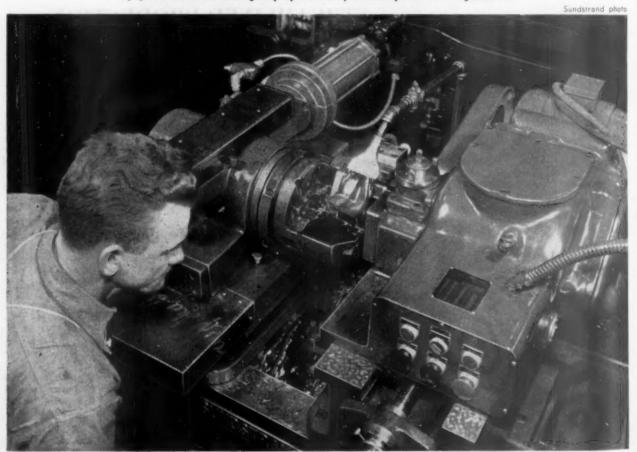
Harmony and cooperation between management and labor can be attained through the industrial relations director and his staff. The director of this section may be assistant to the president of large companies, while in smaller organizations he heads the personnel department. Indirectly, the production schedules are met and bettered through this organization. This department, when properly organized, has increased production as much as 25 per cent.

In the postwar period, management may have to stabilize employment to an average number which may be determined as a result of sales studies and reports. Management may have to consider diversification of products to compensate for uneven sales distribution. This increases the importance of production engineering and production control. It means that conversion, at least in degree, may be here to stay.

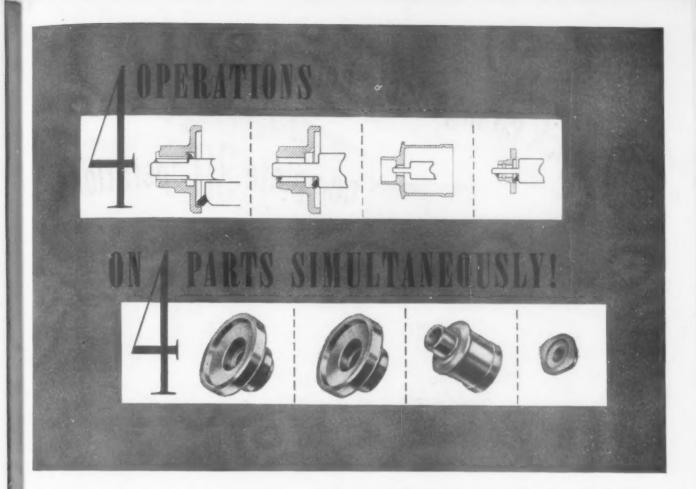
Conversion of skilled and unskilled labor, conversion of equipment and conversion of plant space and facility has been a new story to many war production plants. It is becoming an old story which may be applied in degree or entirety—not just for reconversion, but throughout months and years of peace.

The End

Special tooling can mean high production economy. Proper specification of equipment demands intelligent preparation by a sound production organization.



94



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WORCESTER 6, MASS.



This Heald Bore-Matic is arranged to precision finish four different parts in the same cycle. Adapter Assembly, Housing, Adapter and Coupling are held in rotating fixtures and several finishing operations performed on each piece-including facing, boring, counterboring and chamfering.

HEAIN Bore-Matic

MOST VERSATILE MACHINE TOOL

Internal and Surface Grinding Machines . Bore-Matic Precision Finishing Machines

JANUARY, 1945



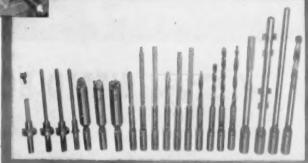
W. F. and John Barnes 3-Unit Type Machine showing drill head equipped with quick-change collets and adjustable adapters.

W. F. and John Barnes Unit-Type Machine Handles These Operations Faster Through Combined Cuts and Tool Change . . .

QUICK - CHANGE collets and adjustable adapters make it profitable to combine a large number of operations on one special unit-type machine. Instead of having a number of single purpose machines for drilling, boring, reaming, facing, counterboring and similar work, it is possible to do this work on one machine using quick-change cutting tools.

On the cylinder and cylinder head shown, it was necessary to complete 30 operations. Production did not warrant individual machines for drilling, boring and reaming the valve holes, rocker arm holes and miscellaneous small holes. To do these operations on one machine, W. F. and John Barnes' engineers worked with the manufacturers' engineers and devised quick-change tools to be used on a 3-unit type

machine. Using electrical con-



These are the various cutting tools with quick-change collets and adjustable adapters.

trols for each unit, it is possible to stop the drilling heads and change cutting tools rapidly.

This method of changing cutting tools for different operations will enable you to meet both present and postwar production demands. W. F. and John Barnes' engineers will be glad to outline the advantages of quick-change tools and advise you how to combine cutting operations to produce more at less cost. There is no obligation for this service.

FREE Descriptive Data: Additional information on W. F. and John Barnes Unit-Type Machines is contained in Bulletin No. 145, Learn how others are solving their machining problems. Write today for this data.



W. F. and JOHN BARNES

325 SCUTH WATER STREET . ROCKFORD, ILLINOIS, U.S.A.

F.& JOHA

PRODUCTION DATA SHEET

CHECKING TAPER PLUG GAGE WITH ROLLS

CHARLES L. HALL

Copyright, 1944, The Bramson Publishing Company

ONE of the simplest methods of determining dimensions of a taper plug gage, as illustrated in the accompanying drawing, is by use of rolls in conjunction with the following formula:

A = DE - 2(B + C)

A = small end of the plug gage

B = radius of roll multiplied by the cotangent of an-

gle z

C = radius of roll

DE = overall micrometer

reading.

Example: To determine the size on the

- small end of a 12° taper plug gage, using a .500" roll, first

find angles x, y and z.

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ons

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 $y = 84^{\circ}$

 $z = 42^{\circ}$

A = dimension to be checked Then:

 $B = .250 \times \cot 42^{\circ}$

 $.250 \times 1.1106 = .2777$

C = .250

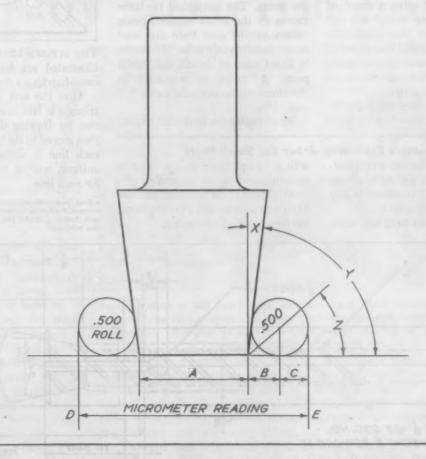
DE = overall micrometer

reading.

Applying the formula A = DE - 2(B + C)

A = DE - 2(.2777 + .250)

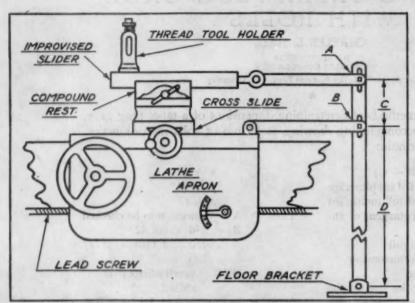
A = DE - 1.0554



NOTE: This is the thirty-ninth of a series of Data Sheets to be published in THE TOOL ENGINEER. A handy three ring binder can be secured at any dime store to hold the sheets for quick reference.

THE TOOL ENGINEER FOR JANUARY, 1945

THE CRIB



Lathe Attachment for Screw Threads

THE PROBLEM of using a standard lathe to cut a screw thread of a different pitch from that obtainable from the gear train and lead screw of the lathe is answered by the application of the attachment shown in the accompanying sketch.

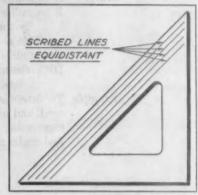
An improvised slider which carries the tool post, is mounted on the com-

pound rest of the lathe and is moved by the power transmitted through the levers. The carriage of the lathe moves in the usual manner, being driven by the gear train and lead screw, consequently point "B" moves in direct ratio to the carriage, while point "A" moves in proportion to the difference between distances "C" and "D".

By arranging the gear train to pro-

duce the lead nearest to that desired, the linkage can be adapted to cover any pitch between that used and the next normal lead. Should an exceptionally long screw be cut by this method there would be some variation in the pitch due to the arc of the lever, but this should not be excessive if the fulcrum is maintained at the floor.

Ruled Triangle for Cross-hatching



THE SCRIBED LINES on the triangle illustrated are for the purpose of cross-hatching a drawing.

After the first line is drawn the triangle is laid over the line in position for drawing the next line. It is then moved to the left one space after each line is scribed. This permits uniform spacing without measuring for each line.

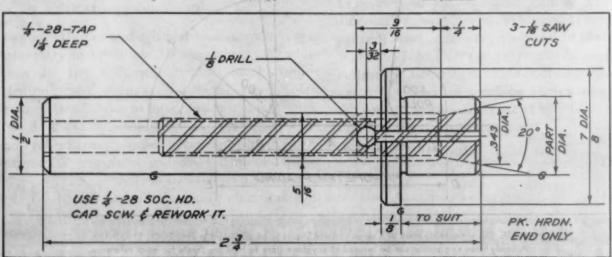
Send your time-and-material-saving ideas to The Bramson Publishing Company, 2842 W. Grand Boule-vard, Detreit 2, Mich. Five dollars are paid for each idea published.

Inexpensive Expanding Arbor for Small Work

Sketch below illustrates an expanding arbor which is simple in design and can be quickly produced in any shop requiring such a tool.

A standard socket head cap screw

with a turned taper on the head is recommended for the expanding element. This can be adjusted with an Allen set screw wrench after the work has been applied to mandrel.





OK Machine photos

Punch and die setup for forming socket wrenches from steel tubing. Die produces 250 pieces per hour at half cost of fabricating from flat stock.

WRENCH SOCKETS FORMED FROM STEEL TUBING

L. A. PUGGARD

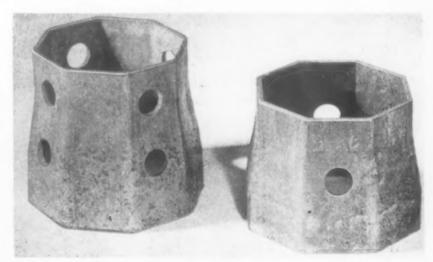
CHIEF ENGINEER

OK MACHINE COMPANY

RABRICATING wrench sockets from steel tubing has resulted in saving time and material. Use of tubing produces sharp inside corners and slightly increased wall thickness with greater strength at the smaller end of the socket. This method was adopted to supply a rush order for several thousand parts to the general specifications of a sample which had been made from flat stock.

One reason for fabricating from tubing was that toggle presses were not available, and the depth of the socket was too great to permit application of air or spring pressure in forming. Approximately 5" travel on the pressure pad would have been required. However, the appearance of the sample was another reason for investigating fabricating methods closely. Excessive die marks on the outside, and a thinning of the ½" stock at the small end indicated need for careful die design.

A study of the sample raised questions concerning design, which of course would bear on the operations required to produce the wrench sock-

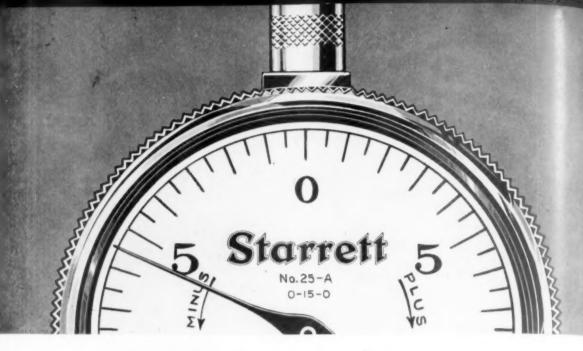


Socket wrench at left was formed from flat stock. Note die marks. Tubing was used to form socket wrench at right. Greater strength, sharper corners are advantages. Redesign of part found the height of original sample excessive, reduced number of holes to two.

et. First, there seemed to be little reason for making the part as long as 4", and second, there did not seem to be a good reason for drilling eight holes for tightening. By subjecting the wrench socket to a variety of jobs, it was found that 3-1/4" was a sufficient length. But even this depth was more than could be drawn on the equipment at hand.

Result was design of a die to produce the wrench socket from steel tubing having ½" wall and 4-½" OD. As drawn, the smaller end of the part shows an increase in thickness of 1/64". The die is producing 250 wrench sockets per hour, at about one-half the cost that would be required to fabricate it from flat stock.

The End

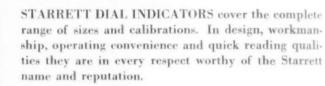


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Material Substitutions Reduce Weight and Cost

Substitution of brass stampings and laminated plastics for bronze castings conserves critical materials, reduces weight and fabricating costs

Material substitution in war production sometimes enables not only substantial economies in critical materials, but also in product weight, manpower required in manufacture, and in finished cost. Indicating numerous peacetime applications, Kaydon Engineering Corporation has saved both war production materials and man-hours through development of brass stampings and laminated plastics to replace bronze castings in bearing separators and roller bearing cages in gun mounts.

Savings in weight achieved by Kaydon through use of the stampings instead of castings range as high as 72 per cent. The substitution of plastics enable weight savings of as much as 86 per cent.

As the leading manufacturer of 40 mm. Bofors Gun Twin Mount and Quad Mount Bearings for the Navy, this concern was required to produce combination radial roller and thrust bearings with separators and rollers. The Twin Mount bearing has an outside diameter of 50" and the Quad Mount bearing has an outside diameter of 64½".

CORROSION A FACTOR

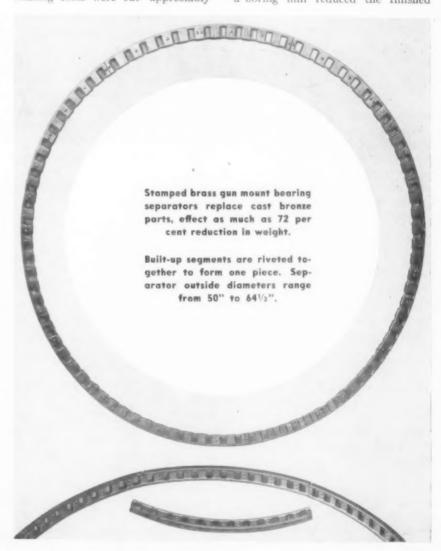
Bearings were first made with cast bronze separators. Then, to conserve critical materials and to reduce weight, designs were made of a stamped-type of separator. This unit was usable with the gun mount bearings supplied previously by the corporation. In changing the materials used, a substantial reduction in fabricating cost was likewise made.

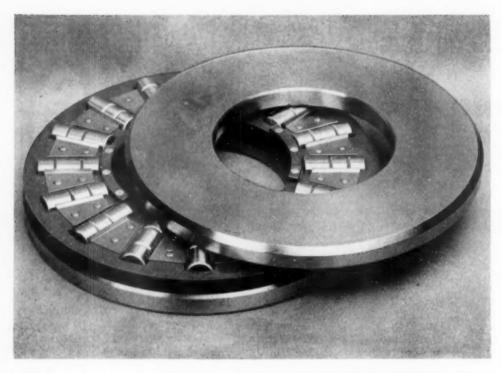
Brass stampings were used instead of steel because of the corrosion factor, especially at the points where rubbing occurred between the separator and rollers, and between the separator and roller paths or races. This rubbing, it was found, wore through either cadmium or zinc plating used on stamped steel.

Although reduction in weight was the outstanding achievement by the change in material specification, fabricating costs were cut appreciably through elimination of much machin-

For example, on the thrust separator for the 40 mm Twin Bofors the original casting weight was 62 pounds and the finished weight was 27½ pounds. Weight of the stamped type is 9½ pounds, or a saving in weight of 65.5 per cent.

Casting weight of the radial separator for the same gun mount weighed 90 pounds. Machining on a boring mill reduced the finished





Weight reduction of 86 per cent was achieved through substitution of laminated plastics for bronze in roller thrust bearing cage.

Spring steel clips riveted to cage retain rollers during assembly, do not touch them during operation.

Kaydon Engineering

casting to 42 pounds. Since the stamped type weighs only 11.5 pounds, the savings in weight amount to 72.6 per cent.

(An accompanying table provides complete data on relative weights of casting and stamped-type jobs.)

The thrust separator is made from built-up segments riveted together to form one piece when finished. In the case of the radial separators, the Twin is produced in seven segments and the Quad in eight segments. These segments are installed individually to facilitate inspection of roller paths, rollers and separators. Any one segment may be lifted out for examination.

FURTHER ADVANTAGES

Shipping weights and space required were likewise reduced. These reductions facilitated handling during shipment as well as during fabrication, storage and installation in the Gun Mounts.

The stampings are made from Cartridge Brass Composition E, ½ HD. (Q-B-611) with rivets of commercial copper or brass. Since the rollers and roller paths are chrome plated, the complete assembly is corrosion resistant.

Another Kaydon development is the design of a laminated plastic cage for roller thrust bearings, which eliminates the use of bronze, a critical war material. This plastic cage is believed to be the first of its type

WEIGHT REDUCTIONS THROUGH SUBSTITUTION OF BRASS STAMPINGS FOR BRONZE CASTINGS

GUN MOUNT BEARINGS			R	RADIAL SEPARATOR				
	Casting weight	Finished weight	Stamped type	% of saving	Casting weight	Finished weight	Stamped type	% of saving
40 MM Twin B	ofors 62 lbs.	271/2 lbs.	9.5 lbs.	65.5%	90 lbs.	42 lbs.	11.5 lbs.	72.6%
40 MM Quad	Bofors 90 lbs.	38 lbs.	13 lbs.	65.9%	125 lbs.	54 lbs.	15 lbs.	72.2%

applied to roller thrust bearings.

The accompanying photo shows this cage with its accurately formed pockets for rollers. Spacers are riveted to the cage forming a hub on which the weight of the cage is carried. The roller thrust bearing illustrated is 5.002" I. D. x 9. 968" O. D. x 1.750" high.

Rollers are retained by spring steel clips riveted to the cage. These clips do not touch the rollers during operation, as they serve only to retain the rollers during assembly and handling. Quick removal of the rollers is possible without removing any other parts such as bands, screws or rivets, or bending back of bronze fins. The rollers may be snapped out easily and replaced.

Shape of the clips permits an ample reservoir for lubricant when grease is used, and permits free circulation of oil for higher speed applications where oil is necessary. This laminated plastic cage not only reduces weight, an important factor in armament, but eliminates the use of critical bronze, long the standard for cages of this type.

Manufacture of the cage can be performed by women through use of a master pattern in conjunction with a saw and router. The steel clips are made in simple stamping, piercing and forming operations, and assembly is performed easily on a riveting machine.

The material used is a laminated phenolic with a fabric base imparting such excellent mechanical properties as high impact strength or resistance to shock, high dimensional stability and high resistance to wear.

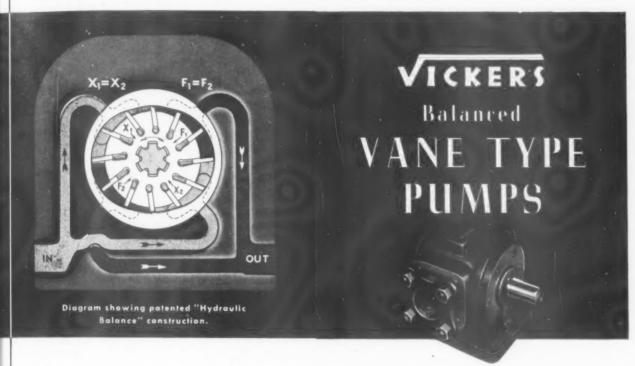
Weight of the redesigned cage is about 14 per cent of a comparable bronze cage. Pointing up the postwar significance of this development is the trend toward weight reduction in machinery of all types.

THE END

HYDRAULIC BALANCE

BEARING LOADS

Means MUCH LONGER PUMP



As illustrated by the diagram above, equal and opposing pressure areas are provided on the outlet side and on the inlet side of Vickers Balanced Vane Type Pumps. The equal and opposing radial hydraulic thrust loads cancel each other . . . consequently there are no bearing loads resulting from pressure. The major cause for wear is thus completely eliminated and the result is much longer pump life. This "Hydraulic Balance" construction is exclusive with Vickers Vane Type Pumps; it also permits an unusual design compactness and is an

important reason for the exceptionally high efficiency of these pumps.

Vickers Balanced Vane Type Pumps are available in single-stage for 1000 psi (see Bulletin 40-25a); two-stage for 2000 psi (see Bulletin 40-16) and also two-pressure, large-small volume (see Bulletin 38-14). Vickers Application Engineers will gladly discuss with you the many different types of hydraulic power and control circuits on which these pumps have improved machine performance. Write the office nearest you.

VICKERS Incorporated . 1416 OAKMAN BLVD. . DETROIT 32, MICHIGAN

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VARIABLE DELIVERY

NEW PRODUCTION MACHINES

Among the first releases of postwar machine tools are these which indicate positive reductions in future production costs

RESAGING developments in postwar machine tools, that may aid in closing the gap between increased employee earnings and static sales prices, are three new process tools recently announced. Monarch Machine Tool Company, Sidney, Ohio, is offering a new "Shape Master" lathe, while the Wales-Strippit Corporation, North Tonawanda, New York proposes a new system of hole punching. Paralleling these announcements is one by the Michigan Tool Company, Detroit, of a new gear cutting process.

The Improved Shape Master

THE LATEST "Shape Master", illustrated in Figure 1, will handle work up to 16" in diameter and incorporates refinements that were not included in the short-lived model that was withdrawn at the start of the war to permit concentration on standard lathes.

Capable of doing the most intricate shaping and forming work, the new machine makes possible turning, boring or facing in almost any desired

Oval-shaped bottle molds, dies for glass or plastic dishes, and punches or spinning chucks for silverware and hollow ware of all types can be machined, moreover, the original mold can be duplicated exactly, as many times as needed to put the product involved on a mass production basis.

a mass production basis.

The "Shape Master" mechanism consists of three elements. One controls the shape cut. Another regulates the rate of repetition of the shape on any given circumference. A third controls the contour generated on successive diameters.

The tool-actuating mechanism, mounted on the carriage crossbridge in place of the usual compound rest, is cam-operated. A cam follower is linked to the movable tool carrier—which rests on anti-friction bearings—and guides the tool in a shaper-like stroke which is adjustable from 0 to 2 inches.

The master cam itself records only a single element or unit of the desired design or pattern, whether oval, triangle, square, hexagon, or a non-geometric shape. Repetition of the shape to be cut is determined by the geared relationship of cam and spindle revolutions. A single motor powers both, and the machine has been provided with sufficient change gears to give a range up to 500 shapes or tool actuations per revolution of the work.

revolution of the work.

The "Shape Master" further simplifies the work of shape generation by making its own master record cams.

Provision has been made whereby a simple, motor-driven cutting head can be substituted for the cam follower. Then an enlarged template of the section desired (only a segment is needed in the case of a symmetrical form) is chucked and a stylus or follower is substituted for the tool. The chuck is slowly rotated and the machine "works in reverse" to cut its own cam.

The overall contour of the work can be manipulated in two ways. A stroke-compensating device makes it possible to maintain the same shape over a constantly increasing or decreasing diameter of the work piece. Irregular contours can be obtained by the use of a metal template in conjunction with the Keller electrical controls.

• Wales Hole Punching System

THIS SYSTEM consists of Wales
Type "CD" Hole Punching Units,
Templates, Locator Rings, Adjustable
Stops, Feed Rails and Drill Templates.
With these parts, making a perforating
die is a simple assembly job which produces many time-saving and moneycaving advantages.

saving advantages.

Wales Type "CD" Hole Punching Units consist of two parts — punch and die assemblies which are independent and self-contained for quick easy mounting to templates, then to die sets, or mounting direct to die sets. The punch assembly consists of a holder which holds the punch, stripping spring and guide in exact relationship to the die assembly which consists of a holder with a built-in slug clearance chute, a die and a pilot pin. The pilot pin in the punch assembly is part of the punch.

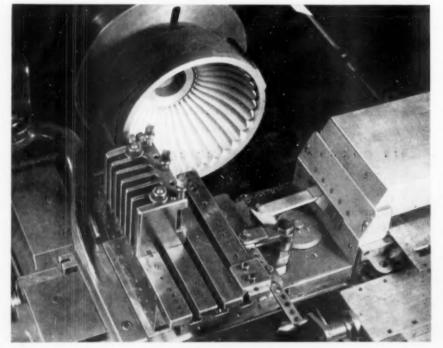
• Set-ups are made outside the pressure and are ready to start punching on the first down-stroke of the ram. No adjusting or aligning is required by these units when mounted to templates or to die sets. The press ram requires only one adjustment regardless of the number of hole punching patterns because of the uniform shut height of Type "CD" Units.

All parts of these units are rapidly interchangeable. Punches and dies are easily removable and replaceable for sharpening without disturbing the set-up. This system does away with making special punches and punch plates, making special stripper plates and making special die buttons and die plates. In addition, the punches dies and stripping mechanisms are standardized by being component parts of the units.

• The two methods of mounting these units into a multiple hole punching die are: to templates, and direct to die sets Different pairs of template set-ups for punching various hole patterns may be bolted to the same die set which permits the die set to remain in the press for all pattern runs. Mounting Type "CD" Units direct to die sets is most advantageously used for unusually long runs. The same die set may be used for other pattern setups providing the pilot and mounting holes do not fall in the same locations as previous patterns.

Both of these methods of mounting require the drilling of two mounting holes and one pilot hole for each die asembly and punch assembly. Each

FIGURE 1. The tool-actuating mechanism of Monarch's "Shape Master", mounted on the carriage crossbridge in place of usual compound rest, is cam-operated.





When machining bar stock with roller turners, you'll step up output and step down costs with Carboloy Roller Turner Tools.

Designed for extra long tool life and rapid regrinding, Carboloy Roller Turner Tools remove stock faster, hold more uniform size, and produce a better finish.

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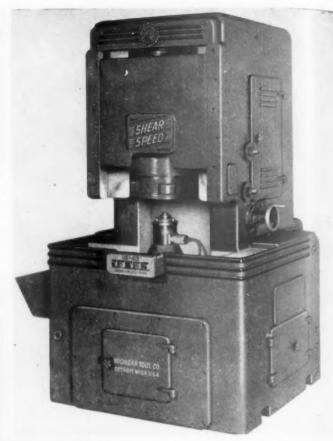
Cleveland . Houston . Les Angeles . Milwaukee . Newark . Philadelphia . Pittsburgh . Thomaston, Conn.



Abore: FIGURE 2. Work done by Wales "CD" units in stamping press.

Below: FIGURE 3. Closeup of Wales hole punching units on die assemblies. Right: FIGURE 4. New Michigan gear shaper designed for rough and semifinish cutting up to 4" diameter. Ram containing cutter head is shown in the upper, or loading position.





pair of tapped mounting holes is located by Drill Jigs from the pilot pin hole. Drill Jigs have built-in pilot pins for exact locating in relation to this pilot pin hole. Locator Rings are used with template mountings to line up punch set-up with die set-up. For quick, accurate locating of the work during feeding operations, Work Stops are available with adjustable gauge rods. These Stops are clamped to the die holder,

To eliminate sagging of the work, feed rails are available for bolting to templates in the same manner as die assemblies.

Wales Type "CD" Hole Punching Units are available in four sizes—1-1/8, 1-3/4, 1-3/4, 2-3/4 holder widths to punch holes up to 1-1/8" in diameter in material up to 1/8" thick.

Locator Rings, Adjustable Stops

Locator Rings, Adjustable Stops and Drill Jigs are available in four sizes to fit the four sizes of die assemblies. Feed Rails are made in 10, 20, 30, 40 and 50 inch lengths.

New Gear Cutting Process

A NEW method of gear cutting has been announced by The Michigan Tool Company, Detroit, for cutting all gear teeth simultaneously with radially-fed form-tool blades having a shear-cutting action. The new machine is capable of rough and semi-finish cutting as many as 60 to 100 gears per hour. Cutting time on the gear shown in Figure 5, for instance, is well under one minute.

In addition to its vastly higher output rate, the new machine uses for the first time balanced cutting pressure around the gear.

The machine is exceptionally easy to



FIGURE 5. This 4"-diameter, 1"-face width, 51-tooth gear can be cut in few seconds by the "Michigan" method.

operate, gears are merely placed on the work holder. Chucking is part of the automatic machine cycle. When the machine has completed its cycle it returns to loading position automatically and releases the finished gear for removal and loading of another blank.

To sharpen blades, or to change over to another type of gear to be cut, the entire inner cutter-head assembly is removed, as a unit, permitting insertion of another cutter head and resumption of productivity by the machine

Shoulder gears can easily be handled on the machine, since its action in this respect is similar to that of a shaper cutter. Helical gears as well as spur gears can be cut on the gear shaper.

Among design features of the machine are its extreme safety of operation, and exceptional rigidity. Figure 4 gives an idea of the unusual amount of "beef" provided in the Michigan "Shear-Speed".

Special provision has been made for rapid chip clearance from the work in view of the tremendously high rate of metal removal possible. Cutting flud supply is located in the base of the machine and is used under relatively high pressure to wash out the chips from the work.

Unusual care has been taken to provide accessibility throughout the machine for making adjustments or repairs. All control circuits, hydrauk or electric, are easily accessible. Openings in the machine base and column are of generous size to facilitate any necessary adjustments in the interior mechanism, if required. THE END

PRODUCTION ROUND-TABLE

- Seeking significant trends in metal-working industries, Bramson Editors held Production Round-Tables with manufacturing executives in seven cities from coast-to-coast during the past year.
- Because of the widespread interest this feature has evoked, the Editors have decided to continue it. In the future, Round-Tables will be conducted periodically as new trends of interest develop in mass production and metal-working industries.—THE EDITORS



The Sheffield THREDCHEK provides a more specific and accurate check of critical thread elements than the conventional collective check.

Two GO rolls serve to pass parts that are not oversize and which will assemble. These rolls screen out parts which are oversize or which will not assemble because of an excessive error or combination of such errors in lead, angle and pitch diameter.

As the parts are passed from the GO or assembly rolls and are presented to the two NOT GO rolls, one of which is mounted so as to actuate a dial indicator, the dial shows whether the pitch diameter is too small and by how much. Should the pitch diameter show as being within tolerance limits and near basic, then it can be assumed that lead and angle are not only within tolerance limits but

are also of the highest dimensional quality.

A free-rotating backstop enables the part to be properly located for accurate checking and also permits checking for out-of-round. The backstop, together with the indicator, eliminates the need for a trained sense of "feel" in making the NOT GO check—a most important advantage of the THREDCHEK.

Both sets of rolls are PRECISIONPLATE— Sheffield precision chrome plate—for longer life. Full manufacturing tolerances may be utilized because wear allowance is compensated by adjusting the rolls on their eccentric axis. The open end style permits checking close to a shoulder.

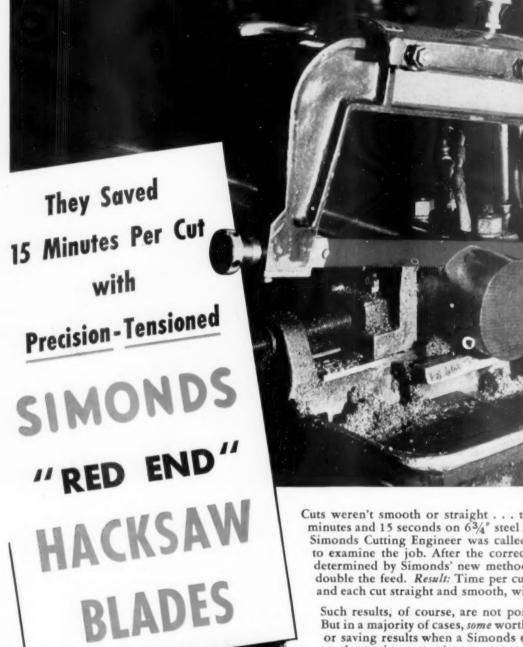
THREDCHEKS are available in frame sizes corresponding closely to Sheffield Thread Roll-Snap Gages, with standard or special pitch rolls. Write for engineering data "Instruments #8".

THE SHEFFIELD CORPORATION

Daylon 1, Chio, U.S. A.

MACHINE TOOLS . GAGES . MEASURING INSTRUMENTS . CONTRACT SERVICES





Cuts weren't smooth or straight . . . time per cut was 27 minutes and 15 seconds on 63/4" steel rounds ... when the Simonds Cutting Engineer was called into this war plant to examine the job. After the correct blade-tension was determined by Simonds' new method, it was possible to double the feed. Result: Time per cut shortened 50%... and each cut straight and smooth, without ladder-marks.

Such results, of course, are not possible in every case. But in a majority of cases, some worthwhile improvement or saving results when a Simonds engineer gets a look at the cutting operation . . . no matter whether it's on metal, wood, or other materials. And there's no obligation. Just tell your Industrial Supply Distributor of Dealer to bring the Simonds man to your plant.

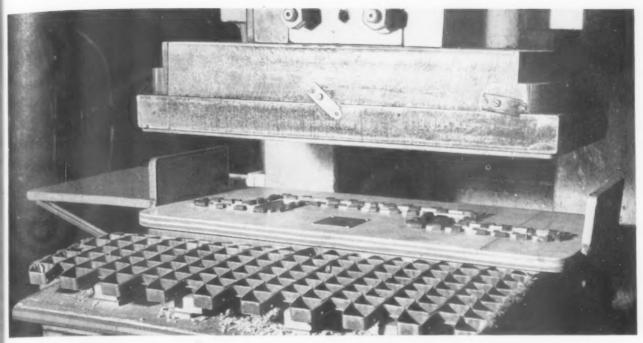
1350 Columbia Rd., Boston 27, Mass.; 127 S. Green St., Chicago 7, Ill.; 228 First Ave., San Francisco 5, Calif.; 311 S. W. First Ave., Portland 4, Ore.; 520 First Ave. So., Seattle 4, Wash.; 31 W. Trent Ave., Spokane 8, Wash.



SHORTEN THE WAR . . . BUY BONDS

PRODUCTION TOOLS FOR CUTTING METAL, WOOD, PAPER, PLASTICS

FITCHBURG, MASSACHUSET



The rule die assembly installed in a punch press and made ready for operation. This development has made possible mass production of uniformly cut flexible parts. It is estimated that more than 15,000 parts may be cut on these dies.

Rule Dies for Punch Presses

DROBLEMS involved in the mass production of uniformly cut flexible parts for use in the aircraft industry have been solved with the development of rule dies adaptable to punch press operation.

Solution was found in an innovation developed in the Tool and Die Making Department of the Vultee Field Division of Consolidated Vultee Aircraft Corporation. This development insures uniform contact between the pressure or "kissing" plate and the rule die, eliminates elaborate setups and adjustments, is simple to construct, easy to install and is capable of long usage without service or repair. It is estimated that more than 15,000 parts may be cut on a set of these dies without maintenance

The die block, made of laminated hardwood, is designed with an open-This opening to receive the material.

ing is bordered by the rule die, whose location is determined by the size of the flange. To provide a holding means within the die block, the rule die is slotted. Hollow punches are placed between it and the opening to make attachment holes in the pad flange. back-up plate or block, which allows for the depth of the pad, is attached to the under side of the die block.

The upper half of this tooling assembly consists of a hardened armor or "kissing" plate capable of a certain amount of flexibility. Between it and the die set is a "make-ready" of sheet paper which is laminated in a patchwork pattern to compensate for irregularities on the cutting surfaces of the rule die. The entire success of this adaptation is dependent upon this feature. Through it, proper contact with the rule die is assured, thus making a complete and clean cut of the material a certainty without throwing undue stress on any section of the cutting

Correct pressure has been predetermined by the use of setup blocks which are made to the dimensions of the die block, rule die, and back-up plate. These are used in preparing press and dies for operation.

This development, which is believed to represent the first and only successful application to date involving a rule die with a punch press, is credited with saving 1657 man-hours annually.

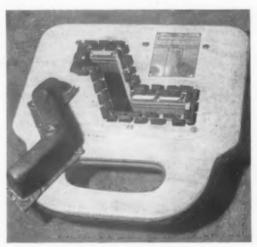
Previous difficulties in the use of rule dies have been in the support of the rule itself, the maintenance of a cutting edge for any appreciable number of parts, and the maintenance of uniform contact pressure between the sing" plate. THE END rule and "kissing"



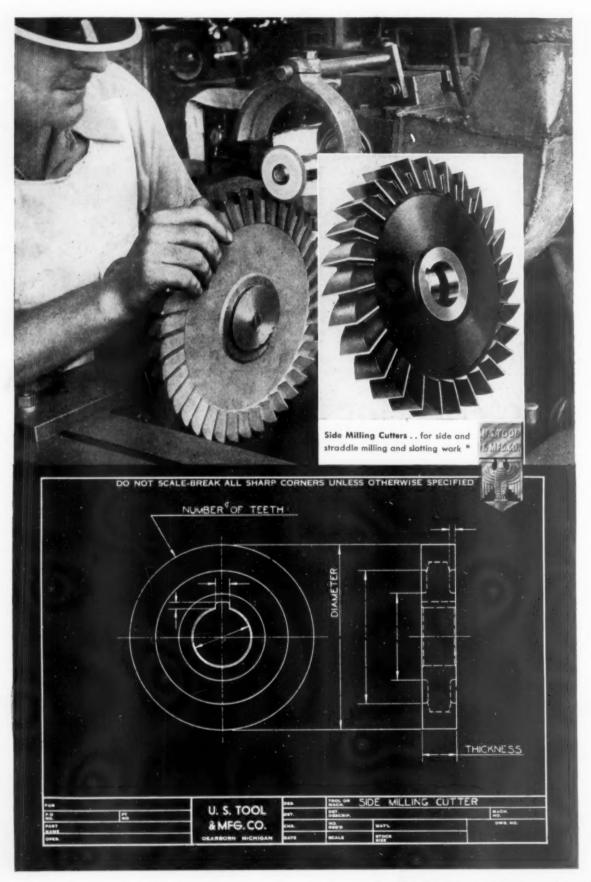
Left: Back-up plate, attached to underside of rule die, allows for the depth of pad to be trim-med. Block should be of sufficient depth to accommodate deepest pad for standardized setup.

Consolidated Vultee

Rule die block, designed for punch press opera-tion, is made of laminated hard wood with opening to receive material. Picture at right shows block with trimmed pad.



JANUARY, 1945



This is a reproduction of one of the 64 pages in or Special High Speed Steel Cutting Tool hand bot . . . a request on your letterhead will bring the complete catalog.



SCRAP SALVAGE PAYS OFF

TONS of vital materials in the form of scrap metal, small parts and special industrial paper are salvaged and reclaimed each year from the machines and networked miles of floors in the Columbus, Ohio, aircraft plant of Curtiss-Wright Corporation.

This reclamation project, under direct supervision of the plant's Waste Material Salvage Department, involves general small parts recovery and sorting; handling of borings, chips and turnings; sheet metal scrap recovery, and paper reclamation.

All floor sweepings and mixed items, such as bolts, rivets, washers, screws, nuts, and Cleeo fasteners that become misplaced or mixed during handling in the production departments are processed as follows:

Floor sweepings are run over a sloping vibrator screen to separate valuable parts from the trash and dust. The dust falls through the mesh of the screen for disposal, while the metallic parts work to the bottom edge of the screen and are caught in chutes leading to suitably-placed containers.

MACHINE SORTS PARTS

Then, parts recovered are passed through Dings magnetic separator which separates steel from non-ferrous articles. From this point, the two types of material follow divergent paths. A "squirrel cage" machine sorts the

A "squirrel cage" machine sorts the parts into five general categories as to width or diameter, the smaller pieces falling through the series of slots at the upper end of cylindrical revolving tube, while progressively larger sizes fall through the proper slots as the material progresses down the slope of the machine. Tote pans catch the pieces in each size group.

Sorting of small parts by type is accomplished on an endless conveyer belt, which has an ingenious gate attached to the hopper which feeds it, resulting in a uniform distribution of

the parts on the belt.

EARL W. SIEGEL

MACHINERY & EQUIPMENT ENGINEER
AIRCRAFT DIVISION
CURTISS-WRIGHT CORPORATION

Four to eight girls sit on either side of the belt, which moves at a slow, predetermined rate of speed, and each operator picks out one or more specific types of material, according to the relative amounts of each class present in the current batch of material being sorted. Fluorescent light, placed low on the working area, give the clear illumination necessary for identification of parts of similar appearance.

Small bread pans are provided within easy reach of each girl, where she deposits the several kinds of parts as they are picked out of the mixture on the moving belt. The pans when filled are emptied into standard steel drums. While bolts, washers, and miscellaneous parts are completely sorted by hand, the aluminum rivets which constitute the largest part of the mixed material received in the department are

processed by a machine.

After coming on the conveyer belt previously described, where they are segregated into groups according to head type and diameter, the rivets are run through a specially designed machine. This machine distributes each of a dozen or more lengths in each diameter used in the shop into separate containers from which they are gathered and returned to the Finished Stores Department for reissue. This machine has a capacity of several thousand rivets an hour, and its operation is so simple that almost completely untrained employees can operate it after a few minutes instruction.

The squirrel cage, endless belt sortting conveyer and rivet sorter were all specifically designed for use in Cur-

At top of page:
Final sorting of small
parts takes place on
endless belt conveyer.
Operators pick out
numerous classes of
parts and put them
in proper receptacles.
Self - feeding hopper
distributes material
evenly on the belt.

Curtiss-Wright photos

Right: Separation of ferrous from non-ferrous small parts, as well as of borings, chips and turnings, is accomplished through the use of a Dings magnetic separator, as is shown in operation.



tiss-Wright plants.

Sheet metal is used in the Press and Shear, Fabrication and Stainless Steel Departments. Each of these departments has boxes or containers clearly and properly marked as to the type of material being handled at the adjacent machine or bench. When a job is assigned to the operator on a machine, a sign corresponding to the material being processed is in a visible position on a scrap container so that it can readily be identified. Material cut is then automatically placed in the proper container.

As a safety precaution, these boxes are equipped with grips of a rounded corner type of construction. When the boxes are not being handled, these grips are pushed into the box to prevent injuries to employees.

HANDLING SHEET SCRAP

Centrally located in the Press Department are two chutes which lead to the basement area of the Waste Material Salvage Department. The chutes are separated, the proper segregated material being placed in a chute only while that particular material is being processed.

After scrap material is received at the lower end of the chute, it is pulled a short distance into a metal briquetting machine which forms scrap bales 16" by 16" by 4". Briquettes are carefully weighed and properly identified by color and code. They are then stored for carload shipment, taking advantage of the maximum price obtainable for scrap in carload lots.

All salvage activities, regardless of whether they involve sheet metals, borings and turnings, or any other type of material, are under the control of one head, thus assuring maximum efficiency.

Chip collectors scrape chips from the pans on machines into carts of proper heighth and design, so that they may be pulled out of the pans into the carts without spreading oil on the floor.

The chip cart is designed so that

Right: As in salvaging sheet metal scrap, materials classifications are heeded in collecting borings, chips and turnings.

Here a chip collector rakes turnings from bed of a turret lathe, which carries label showing type of metal. Note label on collection cart.

At bottom of page: Large chips and unwieldy spiral turnings are reduced to most efficient size for separation of cutting oil in crusher.

Processed chips go from crusher to centrifuge which renders chips more acceptable for salvage.

chips may be easily emptied into larger containers before being transported to the Waste Material Salvage Department proper. All chips, regardless of whether they are aluminum, steel, magnesium or other types of material are collected in this manner and placed in properly identified barrels in areas generating this type of scrap.

CHIP COLLECTION

Chipmen are constantly roving among the machines, keeping the machines free of chip collection. After the chipman places the contents of his cart in the proper containers, a trucker and helper pick up the segregated material and deliver it to the Waste Material Salvage Department proper through a chute.

This chute is constructed so that the floor has a backward slope causing natural drainage of excess oil that may be contained in the chips through gravity to an oil pit. The chips are raked into a chip crusher which breaks

24S

them into finer units simplifying moisture elimination performed by the centrifuge or wringer.

As the chips leave the crusher and start into the chute leading to the wringer, a swinging panel serves as a safety measure to prevent any of the metal from being thrown into the face of the operator.

Different types of chips, either steel or aluminum, are spun in the centrifuge for a predetermined length of time to assure maximum dryness, which is required by the mills to assure both accurate weight and maximum results in their operations.

After the wringer operation has been performed, an electric hoist lifts the entire wringer kettle to the elevated floor. There, the contents are emptied into properly identified containers to await carload shipment.

Miscellaneous briquetting covers many classes of items that cannot be as easily handled as some of the bulk aluminum sheet scrap. Due to the smaller quantities, rather than disposing of them through the chute, they are moved directly to the bailer from the production shop.

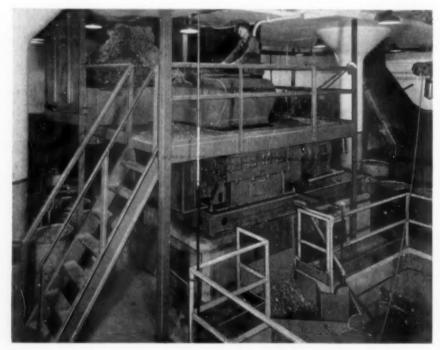
Metal straps that cannot be re-used after being removed from crates received are briquetted. Other items in this category include short ends of tubing and hack saw bands that cannot be resharpened for further use, as well as non-usable aluminum wire.

SAVING WASTE PAPER

Scrap paper from the factory and offices is collected and sorted. That which can be pressed into bulk bales is sold, while office stationery and shop blueprints containing confidential information are shredded, in a special machine for use by the plant shipping department. This operation actually shows a profit.

The Salvage Department has made a close study of the plant's departmental layout resulting in a smooth, unhindered flow of valuable materials through proper channels. In setting up this salvage department, the same care was given to determining sequence of operations as is given good production department layout.

THE END





...a name to remember when you think of BETTER lathes

A lathe is judged by the kind of job it does, and by nothing else. That one fact explains why Logan Lathes have made such headway. The men in the shops, and the executives as well, like the kind of job that Logan Lathes do. There is always a reason when any product wins such wide approval. In the case of Logan Lathes, there are four.

- Advanced engineering characterizes Logan Lathe design, in the spindle mounting, in the countershaft, in the back gear arrangement, in the bed construction, and in many other points.
- More exacting standards and closer tolerances are maintained in building Logan Lathes than were previously thought possible in this field.
- Logan Lathes are built in a new, modern factory, equipped with the best machinery and tooling it is possible to obtain.
- An exceptionally successful management policy, stressing quality of production rather than volume, has produced a personnel of loyal workers who take pride in the Logan Lathe.



Further messages in this series will give you more reasons why it will pay you to see your Logan Lathe dealer or write direct to Logan Engineering Co. for catalog before you invest in a new lathe.

LOGAN ENGINEERING CO.

CHICAGO 30, ILLINOIS

a name to remember when you think of BETTER lathes

A-1

JANUARY, 1945

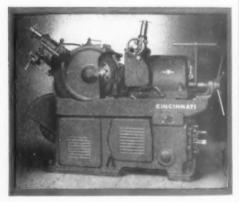
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IT HAS TO BE FAST TO GRIND PLASTICS



Grinding plastic tubes on a CINCINNATI No. 2 Centerless Grinder. Stock removal .050" to .075", at a production rate of well over 100" per minute.

You can't afford to spend a lot of time or money machining plastics, and that's why Cincinnati Centerless Grinders fit so well in the production of such parts. These machines are used extensively for grinding operations on plastic pool balls, electrical insulators, bowling balls, poker chips and tubes and rods of various diameters and lengths. Stock removal may vary anywhere from a fine finish of a few thousandths to a rough grind of rounding up square bars. ¶ The centerless method is ideal for grinding a wide range of parts made from all types of metallic and nonmetallic materials. Cincinnati Application Engineers offer you the benefit of their 20 years of experience in improving centerless grinding procedure.



CINCINNATI No. 2 Centerless Grinding Machine. Catalog G-456-2 contains complete specifications. For a brief description of the Centerless Machines, look in Sweet's Catalog File for Mechanical Industries.



CINCINNATI GRINDERS INCORPORATED SINCINNATION

CENTERTYPE GRINDING MACHINES... CENTERLESS GRINDING MACHINES... CENTERLESS LAPPING MACHINES

INDUSTRIAL NEWS digest

... a review of significant developments and new techniques in mass production industries . . .

Chicago Tool and Die Shops Hit by Manpower Shortage

CHICAGO-Manpower shortages in the Chicago area tool and die industry have been aggravated by draft boards taking irreplaceable journeymen tool and die makers under 26 years of age, according to George W. Rockwood, secretary Tool & Die Institute.

WPB was blamed by Rockwood for refusal to process 42-A special deferments for vitally needed men. This assertion was based on complaints received from tool and die manufacturers. The men under 26 are faster and harder workers than older men, he recently wrote WPB chairman J. A. Krug, and under present conditions cannot be replaced, since it requires four years to make a journeyman.

In the face of recent statements by Krug in Chicago that a critical war production manpower shortage existed in that area, Rockwood suggested relief from the practice of drafting irreplaceable workers.

Cutting Tool Manufacturers Association Names Officers

DETROIT—Completing one year of existence, the Cutting Tool Manufacturers Association re-elected eight former directors and added four new directors at its first annual meeting. The meeting was held here November

Directors re-elected to three-year terms were W. G. Robbins, President, Carboloy Company, Incorporated; O. L. Bard, President, Michigan Tool Company; R. G. Michell, President, Eclipse Counterbore Company; and L. Buffington, Superintendent of Esti-mating & Process Engineering, Ex-Cell-O Corporation.

E. A. Goddard, Vice President, Goddard and Goddard, was re-elected for a two-year term. Norman Lawton, Partner, Star Cutter Company; R. M. Severance, President, Severance Industries, Incorporated, Saginaw; and R. H. Wolfe, President, Arrow Tool and Reamer Company were re-elected for one-year terms.

New directors include G. W. Frick, anager. Firthrite Division, Firth-Manager, Firthrite Division, Firth-Sterling Steel Company; Emil Gairing, President, Gairing Tool Company and G. E. Sheldrick, Sr., President, Mid-west Tool and Manufacturing Company, elected to two-year terms. D. E. Van Deusen, Kelly Reamer Company, was elected for a one-year term.

At a meeting of the Association's new Board of Directors, held here December 8, three top officers were named

Elected were W. G. Robbins, President; O. L. Bard, Vice-President; and R. H. Wolfe, Treasurer.

Action to expand the Association's membership was approved at the meeting and placed in the hands of the Membership Committee, of which Bard is chairman. The plan calls for expanding the membership to take in groups of cutting tool manufacturers first in Illinois, Wisconsin, Ohio, Indiana, and Pennsylvania, in addition to Michigan.

Membership is also being opened to companies in other states. Several companies outside of the state of Michigan already have become members.

Standards Association **Elects New Officers**

NEW YORK— Henry B. Bryans, Executive Vice-President, Philadel-phia Electric Company, was reelected President of the American Standards Association at the technical organization's Annual Meeting December 8.

Other ASA officers named for the

coming year were: Vice-President: George S. Case, Chairman of the Board, Lamson and (Continued on page 117)



Use of "goggle cart" to repair safety glasses in the shop has reduced eye injuries 75 per cent in a big ordnance plant.

Shop workers at the Centerline, Michigan, Ordnance Division of Westinghouse Electric and Manufacturing Company have eye-safety service brought to them on the job through this "goggle cart," operated by girls skilled in the maintenance of safety plasses.

Taken directly to the worker's bench or machine, the cart is stocked with a complete supply of lenses, bows, adjustment screws and other items necessary to keep industrial safety glasses in perfect repair,

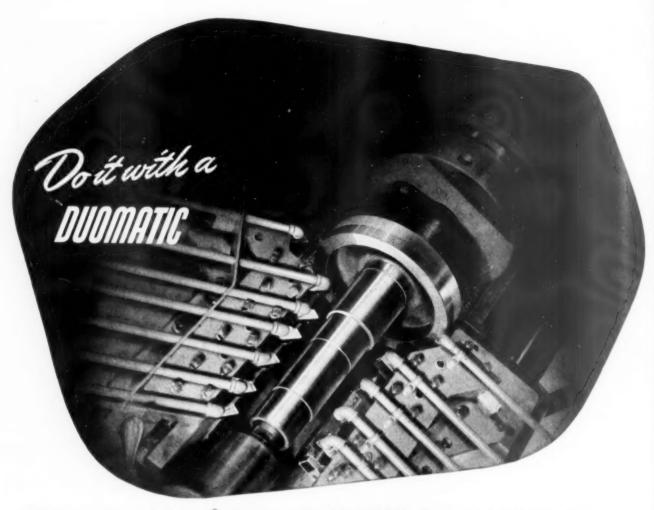
Proof of the value of the "goggle cart" service is the fact that since it was put in service, eye injuries have declined 75 per cent.

"GREENIE"

T.M. REG. BY THE BRAMSON PUBLISHING COMPANY

Blueprint Specialist





USE MULTIPLE TOOLS TO BEST ADVANTAGE

AIRCRAFT
PARTS

The DUOMATIC Lodge and Shipley's full automatic Lathe has greatly enlarged possibilities of multiple tools in lathe operations.

Shown in the illustration above are seven tools front and seven tools rear performing a complex semifinishing operation, turning and facing an aircraft engine component. Also shown is a special coolant piping arrangement.

The dual tool slides, front and rear, can be swiveled to cut from any angle. As a result, any combination of turning, and straight or angular "in" or "out" facing cycles are obtainable . . . front and rear, singly or together.

The numerous features on the DUOMATIC are truly a major advance in automatic lathe design. This Lathe operates with equal efficiency and versatility on large or small lots . . . sets new performance records in the production of every type of aircraft part. Write for complete details.

ENGINE . AUTOMATIC . TOOL ROOM . OIL COUNTRY LATHES

THE DODGE & HIPLEY MACHINE TOOL CO

CINCINNATI 25 OHIO. U.S.A.



(Continued from page 115)

Sessons Company: Chairman, Standards Council: H. S. Osborne, American Telephone and Telegraph Company; Viss Chairman, Standards Council: E. C. Crittenden, National Bureau of Standards.

Stating that the war has made the United States standards-conscious, ASA President Bryans told executives of trade, technical and governmental groups gathered for the Association Annual Meeting that he foresees a big postwar future for standards based on the vigorous leadership of free enterprise, cooperating with governmental agencies.

He cited the strong demand for performance standards for consumer goods as well as in fields not yet touched upon, pointing to the need for international standards in a world in which transport planes must be serviced at airports all over the world; and in which we will be buying and selling mechanical products to scores of coun-

tries,
H. S. Osborne, reporting for the Standards Council on the technical work accomplished during the past year said that ASA approved 157 standards, more than in any previous 12 months period in its 26-year history.

Pointing to the need for international cooperation in industrial standards, Bryans cited the problem in China. "A Past-President of the Association, Mr. Howard Coonley, is in China today carrying the responsibility for putting Chinese war production on its feet as advisor to the Chinese War Production Board," he said. "The Chinese are keenly aware of the basic relation of standards to their production problems and have organized a Chinese Standards Commission."

Total ASA membership now includes 85 national trade, technical and governmental groups. Timken Roller Bearing to Build New Canadian Plant

ST. THOMAS, ONT.—This growing Canadian industrial center will soon be the site of a new bearing and rock bit plant to be operated by The Timken Roller Bearing Company, Limited, Canadian subsidiary of The Timken Roller Bearing Company.

Increased Canadian demand for roller bearings in the automotive, railroad, agricultural, logging, mining, metal working and paper industries; as well as a growing demand for rock bits for mining and general contracting work, led Timken to the decision to open a Canadian plant.

Design of the plant buildings, to be erected on a 75 acre plot, will be started immediately and operations, requiring an estimated 300 employees, will begin as soon as possible.

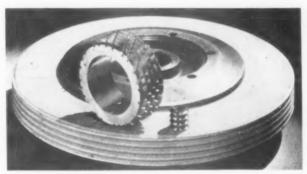
(Continued on following page)

New Gages, Thread Crushing Process Displayed

DETROIT — Sheffield Corporation, Dayton, gave industrial leaders in the Motor Capital a visual progress report on developments in precision machine tools and measuring instruments during the week of December 4. The Ohio Grinder and Micro-Form Grinder were ilanked with new gage developments.

Interest centered on demonstrations of the work of the thread and form grinder, a machine originally developed

Abrasive wheel showing contour formed by crushing with master of hardened steel, together with finished work piece. Wheel is formed and workpieces are reproduced on the same machine.



in England. Sheffield has re-designed the machine to conform to American ideas of automatic operation.

Essentially this machine operates through crushing of a predetermined contour into standard abrasive wheels by means of a hardened steel master and then transfers the contour to work pieces through grinding. The contour is crushed into the wheel at three RPM and work pieces are shaped at speeds from 1725 to 2500 RPM with workpiece turning at 150 to 200 RPM.

Grinding threads to gage tolerances with the single point wheel diamond dressed is conventional American practice. The crusher roll method permits savings in time and materials. Wheels so dressed will produce threads of production accuracy.

Second attention-getter was the Microform Grinder, adapted from a machine of German design. This is actually a 3-in-1 machine: cylinder grinder, universal surface grinder and a precise measuring machine. Without template or master, this machine grinds forms directly from drawings by means of a microscope and pantograph attach-

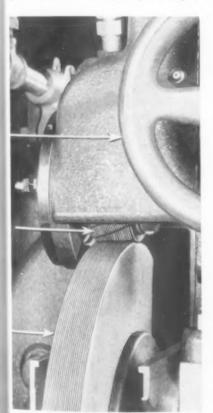
Left: Master (upper arrow) crushing contour into abrasive wheel (lower arrow) for later transfer to workpieces. ment. It is especially adapted for grinding both circular and flat form tools from hardened materials.

Accuracy of grinding to .0003" is easily obtained through a 50-1 ratio between movement of the pantograph stylus and that of the microscope. A counterbalance on the pantograph has eliminated possibility of bearing wear.

stylus and that of the microscope. A counterbalance on the pantograph has eliminated possibility of bearing wear. Sheffield also unveiled their Multichek profile gage. This instrument checks several predetermined profile points simultaneously and indicates by flasher light whether variations outside tolerances exist. By means of an electronic circuit, Sheffield has been able to redesign to eliminate a separate relay for each gage point. Acceptable gaging points are indicated by a green light; a red light indicates out of tolerance measurements.

A gage of unusually high amplification and called Precisionaire was placed on display. Precisionaire provides amplification of 25,000 to 1 on internal measuring and is graduated in five-millionths of an inch increments.

Another "first" was the firm's Thredchek, a gaging instrument making possible a more complete check of threaded parts and incorporating the proved principle of indicator snap and thread roll gage.



JANUARY, 1945

(Continued from preceding page)

ASME ANNUAL MEETING STRESSES PRODUCTION ENGINEERING

NEW YORK-When the American Society of Mechanical Engineers closed their 65th Annual Meeting registration December 1, a total of approximately 3,500 members and guests had attended all or part of the five-day con-

Described enthusiastically by usually conservative Society officials as "outstandingly successful," the meeting could not fail if only by virtue of the unbelievably wide scope of subjects covered in its 73 sessions. Mechanical Engineers roaming convention headquarters in Manhattan's big Hotel Pennsylvania thumbed an 86-page program and found it no easy task to locate even a few of the 278 speakers presented. Subjects covered in separate sessions ranged from "Production Engineering" to "Helicopter Develop-

Although most of the engineers attending came to New York intent on carrying home some knowledge of the most recent developments in their own fields of endeavor, all were looking to the future, wondering what role America's technical minds may play in the postwar economy.

Robert M. Gates, retiring ASME

W. A. SCOTTEN ASSOCIATE EDITOR

President, gave them an answer.

"The changes we engineers have fostered—to create this fast-shifting world of new tools, gadgets, methodsto put to use the great forces of steam, electricity, chemistry-have been made against a background of a slowerchanging human nature, ill adapted in its fundamental characteristics to such rapid change in its environment

'These changes have value," he said, "only in so far as they improve life for human beings. Our civilization can advance only as the adjustments in human relations keep pace with changes in our environment, or at least do not lag too far behind them. The heritage of freedom Americans enjoy, which has permitted our profession to make its finest achievements and which we depend on for future progress, cannot be taken for granted-else we shall lose

Advising ASME members to look be yond their immediate responsibilities, Gates said, "In the years ahead we may expect that the management of industry will be recruited more rather than

less from our profession. The application of engineering techniques, of the engineering mind, to a broad field of postwar problems, not only here in America but also in other countries, will surely be needed. With these prospects, isolationism must not accompany the necessary specialization in en-gineering education."

Bulking large in the technical agenda of the ASME meeting program were two subjects: "Production Engineering and "Metal-Cutting". Fifteen repre-sentatives of industry delivered fulllength technical papers on various phases of these subjects, with another half dozen speakers revealing new developments in such allied fields as materials handling and plant layout.

METAL-WORKING FEATURED

Fully half of these papers presented detailed data on definitely new production and metal-working techniques, tending to prove that the day of the "rule-of-thumb" production man is waning, that these fields of mechanical engineering have taken on the aspects of an exacting science.

Speaking on "Indicated Principles for Postwar Machining," Carl Himmelright described several newsworthy production techniques now utilized by Warner & Swasey Company.

Pointing out that American industry has depended more upon skilled labor for production of war equipment than it likes to admit, he said that "our machine tool equipment, alhough quite reasonably adequate for the requirements of peacetime output previously existent, was not designed to function without dependence upon the high skill of operators. When output was stepped up and machine units multiplied to reach war volume, there were not enough operators to go around.

POSTWAR PRECISION PREDICTED

"That American industry has surmounted this problem and achieved outstanding success, not alone in high production but equally in high precision, can be attributed in all modesty to its mechanical engineers. From the difference in machining practices they have of necessity instituted, there arises an indication of new principles which undoubtedly will be incorporated into accepted practice for successful post-

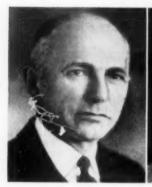
war output.
"High precision—definitely an element of quality-may easily become the competitive factor instead of price. under such conditions.

"It is the capacity to mass produce at high precision and at relatively low cost, developed to meet the war emergency, that becomes of particular importance in the postwar view.'

Among the new processes introduced for war production which may find their way into postwar manufacture he said, is tumbling.
"We have found that tumbling bar-

(Continued on page 120)

ASME PRESIDENT AND AWARD WINNERS



ALEX D. BAILEY New ASME President



EDWARD G. BUDD ASME Medal Winner



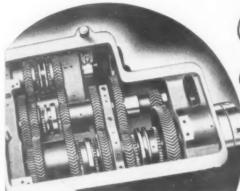
RALPH E. FLANDERS Hoover Medal Winner

· Alex D. Bailey, new President of the American Society of Mechanical Engineers, is Vice President in charge of operations and engineering, Commonwealth Edison Company, Chicago. Active in the ASME since he became a Junior Member in 1910, Bailey took office at the Society's 65th Annual Meeting in New York, November 27 to December 1.

Highest honor of the Society, the ASME Medal, was awarded to Edward G. Budd, President, Budd Manufacturing Company, for "outstanding engineering achievements." Budd pioneered in the development of the allsteel automobile body, steel-disc automobile wheel, the stainless steel airplane and lightweight railroad train, in addition to developing numerous metal fabricating methods.

To Ralph E. Flanders, President of the Jones & Lamson Machine Company and the Federal Reserve Bank of Boston, went the Hoover Medal. The award is made jointly by four societies—mechanical; civil; mining and metallurgical; and electrical engineering. Herbert Hoover was the first recipient. Flanders was this year's winner as an "engineer, industrialist, humanist.'

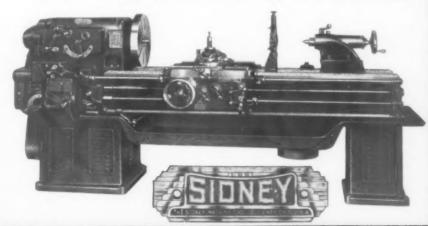
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OHIO

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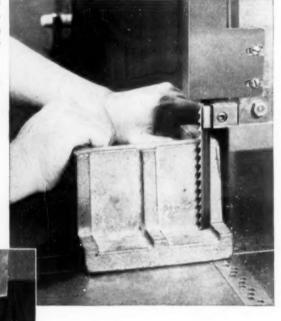


. . . that marks the difference between the ordinary "wide-spaced" tooth band saw and the new

BARNES

Skip Tooth

BAND



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Look for the specially designed shape of the tooth . . . it's there! Thoroughly tested under actual production conditions, this new tooth design is Barnes engineered to facilitate easier, faster cutting of magnesium, aluminum, soft brass and other non-ferrous metals . . . plastics, composition, fibre, wood, etc.

Hard edge, flexible back construction . . . designed for high speed cutting . . . fits any band saw machine. Lasts longer . . . more economical, for it can be used until completely worn out . . . no work-time lost in resharpening.

Your Barnes Distributor stocks the Skip Tooth as well as the complete line of Barnes Band Saws and Hack Saw Blades . . . Call him for full information and prompt delivery on any Barnes product.



ASME ANNUAL MEETING

(Continued from page 118)

rels, sometimes referred to as roto-finish machines, are successful. Not only can burring be accomplished by the removal of sharp edges and corner—all without reducing finished dimensions and risking the induction of cracks or scratches due to the danger of human element on the burr bench or burfing wheel, but we actually have an improvement of the surface finish and quality."

Himmelright pointed out that Warner & Swasey is tumbling finished parts that are finish machined and ready for inspection. "These parts were held to extremely close tolerances during the grinding or finish machin-

ing operations," he said.

TUMBLING TO FINE FINISH

"In fact, the use of the tumbling barrels makes it unnecessary to hold the exact final inspection on surface quality during prior machining or grinding, since the final and designed surface finish can be induced by this method.

"Currently, we are obtaining surface finishes of 6 to 8 micro-inches and breaking of sharp corners with a radius of .008" to .010" on aircraft engine parts such as gears, gears and spline shafts, bearing retainers, and similar

Another development by the machine tool builder, he said, is the shaving of fine tolerance gears, finishing them to close final tolerances after heat treat with no other work "machining or grinding on the gear teeth".

CLOSE TOLERANCE ON GEARS

"To produce gears to these close tolerances, it takes in addition to a close control on the grinding of the shaving cutters, close control of the heat treating by developing a time cycle for strain relieving, carburizing, annealing, and hardening, and this must be carried out step by step to a high degree of precision.

"Our experience suggests that this

"Our experience suggests that this method affords a considerable saving in production over the grinding of gear

teeth

"Take for example, a gear having 22 teeth, 12 diametral pitch and 22½° pressure angle with a modified form.

TREMENDOUS SAVINGS IN TIME

"To grind this gear requires 15 minutes on a form type gear grinder. The same gear requires only two minutes to shave. A saving of 13 minutes of machining time is effected for each gear."

The Warner & Swasey engineer predicted that cutting tools will play an important role in determining future trends in metal cutting. "The matter of the shape and angles of cutting tools, plus the speeds at which they are operated, comes in for considerable emphasis when viewed in postwar," he said. "On their further development depends much that must be achieved for quality, precision, high output and low cost in peacetime competition."

Citing the increasingly exacting demands made upon fixtures, cutting tools and machine tools, the ASME speaker predicted that postwar "high precision, volume production, can be successfully carried on only with equip-

ASME ANNUAL MEETING

ment designed to its specific require-

program of centralized tool control developed at the Puget Sound Navy Yard was credited by W. E. Ains-Master Mechanic at the yard, with increasing production by insuring longer tool life for tools of all types,

Bringing up to date a story he first her 1943, the speaker said that advantages of centralized tool control are many, but the most important is greater output by prolonging the life of

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TOOL CONTROL BENEFITS

Under this plan, the central tool shop is the custodian of all loose, hand, portable and power tools in the industrial department of the yard, and is made responsbile for up-keep, storage, issue, and salvage of the tools. In some cases, this department also manufactures the tools. Such centralization of the tool supply, including grinding and other repairs, enables departments using the tools to concentrate on production exclusively.

Key to the benefits that may be obtained through use of centralized tool control was cited by Ainsworth in stating that "the ultimate goal which this yard is attempting to reach is to have all single-point cutting tools ground by specialists at this central location and made available to mechanics when re-

quired. "It is desirable that tools which become dull be returned to the tool room and exchanged for a sharp tool, rather than have the mechanic stop produc-tion while he grinds this tool freehand. The various cutting angles which mean so much to the life of the tools and, consequently, to production, may be controlled more accurately by machinegrinding. Another advantage is that these tools may be run through the grinding machines in quantities, where setups will be held to the minimum."

ORDER DATA MAINTAINED

The West Coast speaker pointed out that his centralized tool control department "maintains a card-index system showing the amount of each size and type tool in the yard, and their location, including all grinding wheels used in the plant, with information concerning when to order a quantity sufficient for a 90-day supply.

"Duplication of tool purchases is eliminated through centralized tool control, as this group originates the tool request when the inventory of this material reaches the low limit, taking into consideration the time required for delivery."

CARBIDE TOOLS DISCUSSED

Rapid wartime growth in use of carbides in metal-cutting was recognized in two technical papers on varied asspects of carbide tool design and utili-

Fred W. Lucht, development engineer, Carboloy Company, reported on a project his company has undertaken to determine accurately the correct cutting angles and forms of carbide tools for greater efficiency in milling steels.

Results of this research are of prime (Continued on page 123)

No. SSM Shell End Mills, for machining steel. Standard sizes from 11/4" to 6" diameters, 4 to 10 teeth.





No. SEM Shell End Mills, for ma-

chining cast iron and non-ferrous materials. Standard sizes from 114" to 6" diameters, 4 to 8 teeth.

AS MUCH AS 0 times

... with these new

Boost output

STANDARD CARBIDE TIPPED SHELL END MILLS

UP TO 10 TIMES greater output and 4 times longer life between sharpenings, are not unusual with these new Wendt-Sonis Carbide Tipped Shell End Mills that employ a negative rake design feature. Consider these desirable advantages:

- 1. 20" feed compared to a 2" feed of HSS end mill
- 2. Increased surface feet per minute
- 3. 25% longer carbide tips
- 4. Faster, cleaner cutting . . . finer finishes

Carbide Tipped Tools are a specialty with us. We make them exclusively. Our experience, research, development and improvements are your assurance of complete satisfaction when you use W-S Carbide Tipped Tools.

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CARBIDE TIPPED CUTTING TOOLS

BORING TOOLS . CENTERS . COUNTERBORES . SPOTFACERS . CUT-OFF TOOLS . DRILLS . END MILLS . PLY CUTTERS . TOOL BITS . MILLING CUTTERS . REAMERS . ROLLER TURNING TOOLS . ROUTER BITS . SPECIAL TOOLS



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Workpiece is passed directly under contact. No stopping and no backstop required. 30 to 60% faster inspection, accurately.

OUTSTANDING BECAUSE-

Limit lights show immediately any variation in specified dimension. No hesitation, no backstop, positive.

No maximum and minimum masters required to set dimension limits.

Unusual wide-range zero adjustment makes setup simpler, faster and more positive.

Contact pressure adjustable from 2 to 16 ozs.

Four magnifications enable readings from ten microinch to .003". Even finer readings can be estimated.



MODEL 130

This Comparator is of great value for fast, 100% inspection at either Production or Final Inspection. The speed is unusual. There is no necessity for slowly maneuvering the workpiece under the sensitive contact to determine its maximum dimension, nor to bring it to rest against a backstop. Actual time studies indicate savings in inspection time of from 40% to 60%.

Either tolerance lights or the meter scale may be used—the lights for fast, 100% inspection; the scale for selective inspection. The indicating hand swings positively and stops definitely and quickly.

This exceptional Comparator is a decided advance in gaging devices. Its flexibility, range, sensitivity and accuracy are worth investigation.

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PRECISION MEASURING INSTRUMENTS

ASME ANNUAL MEETING

(Continued from page 121)

apportance since the widespread adoption of carbide tools during the war has bought with it new conceptions of natal cutting. At the high machining spreads and feeds possible with carbides, natting conditions are so changed that reviously established data no longer hold true. Thus, an entirely new held of research has opened up which must be thoroughly investigated before the full value of carbide tools can be realized, Lucht stated. An important factor in this new conception of machining is cutting angles and tool form, the subject of Lucht's present investigation.

CARBIDE USE GROWING

The speaker said that it is currently estimated that more than 50 per cent of all metal removed by machining in the United States is now cut with carbide tools, with resulting increases of 8 to 10 times in production.

The tests on correct angles and tool forms described by Lucht are expected to establish definite criteria for the conditions of operations under which such tools will give still greater production at highest economy.

Users of tools tipped with cemented carbides are finding it desirable in numerous instances to use solid carbide blades, mechanically held in standard or special tool holders, according to W. L. Kennicott of Kennametals, Incorporated.

BIG DROP IN PRICE

"Use of solid carbide blades on heavy roughing work has been made possible through improvement in the physical properties of cemented carbides over the past few years," he declared. "Break strengths have been about doubled, permitting the overhang of blades beyond the steel seat and mechanical clamping of various types.

"The greatly reduced price of hard carbide has also been a factor in this development. As recently as 1940, carbide was priced at 45 cents per unit, whereas it is now 3½ cents on large standard blanks. At the higher price it was advantageous to mount a small tip on a large steel shank, but with the price reduction of 92 percent over the four-year period, it has become practical to use much larger tips or, in many cases, solid carbide cutters."

SOLID CARBIDE BLADES

Advantages of solid carbide blades cited by Kennicott: more readily adapted to existing facilities and practices of grinding; freedom from thermal strains common to brazed cutters from large area braze, heat of heavy cutting, heat of grinding; more uniform performance on heavy work or multiple point cutter jobs; lower tool cost per unit of work completed, and lower initial cost in case of large single point tools.

In another paper in the Production Engineering section of the meeting, Edward J. Charlton, Assistant to the President, Lukenweld, Incorporated, Division of Lukens Steel Company, discussed the welding of machinery parts from low carbon hot rolled steel.

Charlton noted the success attained with welded machinery parts in war

(Concluded on page 125)



No production lag herethe dies are made of GRAPH-TUNG STEEL



All along the production front Timken Graphitic Steels are helping to speed production and cut costs by providing longer life for tools and dies.

An excellent example of this superior performance is demonstrated by these Draw Dies made of Graph-Tung Steel and used to cold draw seamless steel tubes and solids. It's a tough job but dies made of Graph-Tung Steel provide up to three times the life of those made of ordinary tool steel.

In one test under actual working conditions dies made of Graph-Tung Steel were used to draw 17,000 feet of seamless tubing. Dies made of a competing steel in the same price range drew only 6000 feet before they were so badly worn they had to be discarded.

To increase the production and to cut the costs of your products use one of the five performance proven Graphitic Steels; Graph-Mo, Graph-Tung, Graph-Sil, Graph-Al or Graph-M.N.S. They are readily available from your nearest distributor or direct from Steel and Tube Division, The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TABLEMAN RES. U. 1 PAT. COPT.

GRAPHITIC STEELS

ASME ANNUAL MEETING

(Concluded from page 123)

and behind it a service record in industries since 1930. one weldhe said, has collaborated in design roduced machinery parts for nearly different users in 15 industries.

The basic impetus behind this gengral acceptance can be divided into two parts: One, economic; the other, engi-

neering," he said,

An additional impetus during the war years has been an abnormal urgency of acquiring necessary parts by any means, as quickly as possible, with the result that many times normal economic justification must have been non-existent.

FUTURE TREND INDICATED

Doubtless the spread in use of fabricated parts has been accelerated simply because trial samples or educational designs embodied them. During the war period great quantities of duplicate weldments have been fabri-cated, while under normal conditions the investment necessary for plants, tooling and other equipment to produce these parts might have awaited eco-nomic justification," the ASME speak-

er said.
"Hence, we will enter the postwar period with existing welderies taking definite forms as industrial units scattered throughout the nation, with many of them devoted exclusively to production of machinery parts. Already some have developed as subsidiaries supplying parts to plants producing finished machinery. Others have developed as an outgrowth of plants previously engaged in other types of fabrication. Still a third group has specialized solely in the production of welded machinery parts."

New England Report: Surplus Machine Tools Auctioned

SPRINGFIELD, MASS. - Expansions, machine tool auctions and utilization of Jamaican labor were high-lights of Western New England metalworking and manufacturing news during December.

Interest in the machine and tool field centered on the acquisition of Geometric Tool Company, New Haven, Connecticut, by the Greenfield Tap and Die Corporation. The transaction includes the purchase by GTD of controlling shares in the 10,505 outstanding shares of the New Haven company, at a reported \$60.00 a share.

Said GDT President Donald G. Miller, "The acquisition of the Geometric Tool Company with its splendid reputation for precision tool-making will broaden the base of our service to the industry. It will enable us to furnish the proper type of thread cutting tool required or best adapted for any job involving the production of threaded parts. It will also expand our facilities for research, screw thread engineering and the production and distribution of precision threading tools."

Springfield, Massachusetts, will become the New England headquarters for disposal of surplus war production machinery by the Reconstruction Fi-(Continued on tollowing page)

To protect your product against costly failures due to



Nowhere else can you obtain all of these benefits, to enhance the salability, performance, and reputation of your product:

- Distinctive properties of resistance to wear, impact, fatigue, corrosion.
- A series of engineered alloys-with physical properties to fit your application.
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- Diversified production facilities, coordinating in one place all the commonly used metalworking processes.
- Engineering and production "know-how" to give you a practical manufacturing program.
- A nation-wide organization of field engineers to assist
- A record of proved performance in hundreds of leading makes of equip-
- national reputation that makes Ampco Metal parts a sales asset.

Send us your prints when you are ready to consider materials. Write for bulletins. Ampco Metal, Inc., Dept. TE-1, Milwaukee, Wisconsin.

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TOOL and DIE WELDING ELECTRODES Help You Effect Savings in Your Plant!

You can save many man hours, conserve material and minimize production delays. Tool steel welding can be used profitably in any plant using tools and dies. Here's how it can be done:

REPAIRING DIES... Existing units that may fail in operation can be welded, either partially or wholly, resulting in a minimum of "down-time".

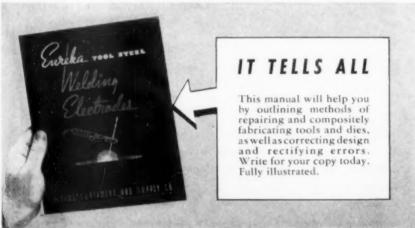
2 COMPOSITE FABRICATING . . . Die units can be compositely fabricated, when practical, by welding, resulting in numerous advantages.

3 CORRECTING DESIGN... Welding facilitates making changes in contour, corners or edges during die "try out" or "change over" periods.

4 **RECTIFYING ERRORS** . . . Welding permits the correction of errors made in tool and die manufacturing resulting in great savings.

For complete information write for technical catalog





INDUSTRIAL NEWS DIGEST

(Continued from preceding page)

nance Corporation, with facilities for housing and showing the surplus property ready for use by mid-January.

Site of the Government "store" will consist of approximately 110 acres of land in Springfield, with additional space in the plant of the Springfield Machine & Foundry Company, West Springfield.

As in other industrial centers where the RFC will sell surplus machines and tools, pre-fabricated sheds are being erected. These metal sheds, about 20 by 100 feet in size, can be readily torn down when need for them passes.

Presaging many another such sale, a three-day auction of machinery and equipment valued at more than \$3,000,000 was held in Chicopee, Massachusetts, early in the month. The metal-working equipment had been used for production of Lee-Enfield rifles at the River Plant of the J. Stevens Company. Virtually all of the machines and tools used on the job were sold.

Keen bidding brought WPB to the scene with a "freeze" order enabling certain war producers to secure needed equipment for urgent programs. More than 200 machines, "frozen" by WPB, went to bidders holding priorities.

With lots drawn between bidders when "offers" reached OPA ceilings, scores of bidders represented such concerns as U. S. Steel, Remington-Rand, General Motors, General Electric, Westinghouse, Uniter has Corporation, U. S. Rubber, Worthington Pump, Gilbert & Barker Manufacturing, Standard Oil, and the Kaiser industries. AMTORG, the Russian Purchasing Commission also was a bidder.

First two concerns to avail themselves of Jamaican labor being brought into Western Massachusetts to ease existing manpower shortages have been Chapman Valve and Springfield Bronze & Aluminum Company.

While only 150 Jamaicans are expected in the first contingent of workers to report, Federal Housing Authority officials have been requested by the WMC to make provisions for housing 400 to 500 before spring.

Tool and Die Association Moves to Cleveland

CLEVELAND—Following a meeting here of its board of directors, the National Tool and Die Manufacturers Association announced the appointment of George S. Eaton, of Lakewood, Ohio, as Executive Secretary. The announcement was made by Association's President Richard F. Moore, President of the Moore Special Tool Company, Incorporated, Biagapo

Eaton was for 20 months a member of the War Production Board's Aluminum and Magnesium Division Forging Section. Since last February he was Chief, WPB Forging Section. Before joining the WPB Eaton was Associate Manager of the Associated Industries of Cleveland, was an instructor in engineering and mathematics at Lawrence College, later a professor of civil engineering at Clemson College.

(Continued on page 128)

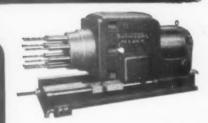
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BARNESDRIL

Whether your drilling requirements involve light and medium, heavy-duty or progressive drilling, you can do the job at a saving by using the proper machine from the BARNESDRIL line of standard drilling machines. Standard BARNESDRIL machines can be adapted to most special drilling applications and each is designed to increase production and reduce operating costs.

For light and medium drilling, requiring capacities of 1" to 2" in steel, make your selection from single and ganged BARNESDRIL Self-Oiling, All-Geared Machines. BARNESDRIL Hydram machines, available in single-spindle, ganged and multiple-spindle arrangements, are ideally suited for heavy-duty work.

Progressive drilling, calling for drilling, reaming and tapping operations in sequence, can be most economically accomplished on BARNEEDRIL All-Geared, Hydram and Hydraulic Production Drilling Units. Units can be arranged in any horizontal, vertical or angular position on work requiring capacities of ½" to 4" in steel.

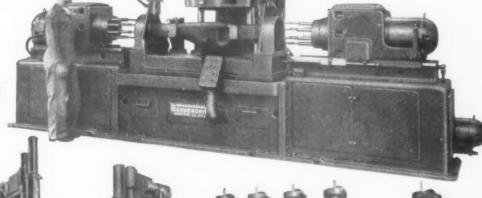


PARKEDRIL Standard Hydraulic Units...
for Special Operations. These standard
units can be combined in any vertical,
horizontal or inclined grouping to produce a special production machine for
many drilling, tapping, reaming, boring
or facing operations. Available with
multiple-spindle heads, as shown in the
illustration at the left, they provide
definite savings in machining time. Bulletin 150-A.



FREE DRILLING DATA

Send today for your free copy of Catalog T, including data every production man needs on the complete BARNESDRIE, line of Drilling, Tapping and Honing Machines.





BARNESDRIL No. 262 Sliding Head Machine.



BARNESDRIL No. H-4 Hydram Inverted Drill.



BARNESDRIL No. H-4 Hydram Machine.



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BARNESDRIL No. 2011/4 Square Column Drill.

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Time Saving Tools for SCRAPING and BALANCING

FASTER. EASIER SCRAPING with this POWER SCRAPER

Has a "natural hand control" . . . as easy to use as a hand scraper. Left hand serves as guide to the blade ... right hand controls the stroke. Pressure of left hand controls depth of cut, but

forward cut requires no back-breaking labor. A slight forward pressure on cylinder with right hand starts swift, smooth forward stroke which can be regulated from nothing to 31/2 feet . . . 60 feet per minute, reverse speed 90 feet per minute. Operator can work at steady rate without tiring as ¼ h.p. motor does heavy cutting. With this machine one man can do the work of several. The Ander-



son Power Scraper, mounted on an elevating truck is easily moved to any location. Machine may be plugged into electric lamp socket and be ready for use. In scraper housing directly across from motor is a scraper blade grinder ... a convenient, speedy means of resharpening scraper blades without leaving machine. Blades are quickly and easily removed from holder.

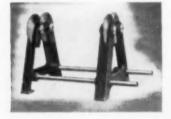


of hand scrapers. Simply remove the high-speed steel blade and slip in the Anderson Carboloy Tipped Blade. If you are already using Anderson Hand

plete new scrapers in order to use car-boloy tipped blades. Speed up your scraping operation with

Scrapers it is not necessary to buy com-

these more efficient, longer lasting blades. They are especially good for the new hard alloy iron and the extremely hard bronze castings used in war equipment.



QUICK, ACCURATE BALANCING WAYS

No Leveling Required

Use these time-tested Balancing Ways for your truing and balancing operations. They save time, save labor and assure better work. Shops handling rotating parts have found Anderson Balancing Ways indispensable in meeting production demands. Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a quick, accurate test of balance. Five sizes . . . 20" to 96" swing.

BUY ANOTHER BOND TODAY



SEND FOR BULLETIN 1-10

INDUSTRIAL NEWS DIGEST

(Continued from page 126)

N. T. D. M. A. offices have been trans. ferred from Washington to the Union Commerce Building, Cleveland. The lakeside city was selected as the most centrally located among the tool and die centers.

Nine committees were organized at the meeting. Committees and their chairmen are: Membership, R. F. Moore, Moore Special Tool Company;

George S. Eaton, recently appointed Executive Secretary, National Tool and Die Manufacturers Association.



Fact Finding, W. G. Ehrhardt, Ehrhardt Tool & Machine Company, St. Louis; Publicity, E. J. Rowan, Jr., Nelpin Manufacturing Company, Long Island City; Ethics, W. L. Warrander, Tools and Gages, Incorporated, Cleveland; Legislative, W. R. White, Jr., Midwestern Tool Company, Chicago; Finance and Policy, Karl Harig, Mig. Co., Chicago; Apprenticeship, W. J. Co., Chicago; Apprenticeship, W. J. Tallman, National Tool & Machine Company, Rochester; By-Laws, K. Janiszewski, Superior Steel Products Corporation, Milwaukee; Industrial Relations, H. V. Anderson, Crescent Manfacturing Company, Rockford Illinois ufacturing Company, Rockford, Illinois.

MATERIALS

Two Magnesium Plants Closed as Surplus Stocks Mount

WASHINGTON-Reflecting a continued decline in military requirements for magnesium, two more plants producing the light metal are scheduled to be closed January 1.

Latest units to be closed, the War Production Board has announced, are the Government-owned Dow Mag-nesium plant at Velasco, Texas, and the Electro Metallurgical Company unit at Spokane, Washington. Partial curtailment has been ordered at the Diamond Magnesium Company, Painesville, Ohio.

Since the magnesium cutback commenced last March, seven Governmentowned plants have been shut down: Dow Magnesium Company, Marysville and Ludington, Michigan; Amco Mag-nesium Company, Wingdale, New York; Mathieson Alkali Works, In-corporated, Lake Charles, Louisiana; Permanente Metals Corporation, Manteca, California; Basic Magnesium, Incorporated, Las Vegas, Nevada; Ford Motor Company, Dearborn, Michigan; and International Minerals & Chemicals Corporation, Austin,

Declaring that war production requirements for magnesium are still declining, WPB says that surplus stocks have almost doubled the amount regarded as a "safety reserve."

THE TOOL ENGINEER



A great variety of punching and forming jobs are done by Cincinnati Press Brakes in railroad car shops. Their flexibility—ease and economy of change-over—make them extremely popular and profitable.

In the shop illustrated, the Cincinnati Brake is handling work ranging from the production of thirty $\frac{1}{8}$ " x 2" clips a minute

to forming 3/8" steel plate sixteen feet long. Such adaptability keeps Cincinnati Press Brakes busy day in and day out.

Write for Catalog B-2, the book of many suggestions.

THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A. SHAPERS · SHEARS · BRAKES (Continued from page 128)

SURPLUS TOOL PLAN OFFERED BY MAKERS

Here is the first detailed report on plans for disposal of surplus cutting tools

DETROIT-Behind a brief announcement here of an industry plan to attack the problem of mounting war surpluses in cutting tools lies an outstanding story of energetic effort by private en terprise to assist the armed forces and Government agencies in establishing an orderly and economical disposal

The plan developed by a committee representing the 51 concerns holding membership in the Cutting Tool Manufacturers Association, has been recommended to various Government agencies interested in the disposal problem. The Reconstruction Finance Corporation, now authorized to direct disposal of surplus war property, is readying a plan for sale of surplus tools contracted for by the various branches of the armed forces. This plan, it is known definitely, will incorporate recommendations made by the Manufacturers Association committee to simplify disposal and insure maximum return to the Government.

EXTENT OF SURPLUS UNKNOWN

Basis of the plan is disposal of surplus new standard tools through manufacturer who originally supplied them to the government agency involved. Special and used standard tools would be scrapped on recommendation of expert industry repre-

Unlike the problem of surplus machine tools, where it is definitely known today how many machines are currently unused and surplus and many eventually will be declared surplus, only the roughest estimates on surplus cutting tool stocks are obtain-No single Government contracting agency has been able to supply figures, and the RFC must base estimates of the size of the disposal job on spot checks of excess stocks in typical war

COULD ELIMINATE SURPLUSES

Cutting tool manufacturers themselves know only that Government contracting agencies in some sections of the country, especially on the West Coast, are saddled with mounting surpluses. Normal peacetime output of the cutting tool industry has been set at approximately \$35,000,000 annually. Purchases for war production have boosted annual industry output to an estimated \$600,000,000,

Believing that a postwar surplus tool problem could be eliminated entirely by a continuing wartime program of tool listing and cooperative disposal from one contracting agency to another, more than a year ago prominent manufacturers undertook to persuade the various contracting agencies to dispose of or put surplus cutting tools to

Partly as a result of the manufacrecommendations, the Army Air Force Materiel Command, Chicago, opened a warehouse there for surplus cutting tools last June and put the industry plan in operation. Results have been described as eminently successful. A committee of tool experts, representing the original producers, inspected the warehoused surpluses and offered AAF officers opinion as to whether the tools could be re-sold or should be scrapped.

RFC PLAN EXPECTED SOON

Other Government agencies showed little interest in the manufacturers' plan until the RFC undertook the problem. The first application of the RFC program, embodying most of the Association plan, is expected shortly.

"If this plan was put in operation immediately and the war should last for another year," one industry repre-sentative said, "the postwar surplus cutting tool problem will not be so bad If it isn't placed in operation, the industry and its skilled personnel will face a period of poor business and lack of work

Under the industry plan, new surplus standard tools would be disposed of through the manufacturers who originally supplied them to the Governinvolved. Such tools ment agencies would be re-sold by the manufacturer at a ratio of one surplus tool to every new tool of a similar type manufactured by the company.

INDUSTRY PLANS DETAILS

The tools would be "sold" to the original manufacturer at discounts from the original price ranging upward to a maximum of 40 per cent to cover costs of sorting, checking, re-wrapping and distribution.

Special and used standard tools would be broken and scrapped, accord-

ing to the plan.

Details of the industry plan were outlined to this magazine by the Association's Executive Secretary, H. J. Merrick, who heads the organization's special committee on surplus disposal. Committee members responsible for development of the plan are W. G. Robbins, President, Carboloy Company O. L. Bard, President, Michigan Tool Company; and E. C. Putnam dent, Putnam Tool Company, Putnam, Presi-

Briefly, the Association plan embodies the following points:

"A Government agency such as the RFC to be authorized to purchase these tools from the various Government department at their cost price.'

RFC to consign "new standard cutting tools to original manufacturer at from 60 to 80 per cent of the original cost for an indefinite period terminated by either party at any time, pro-

viding the manufacturer will agree to dispose of same at a rate of not less than one for one; the exact percentage to be negotiated between the manufac turer and the RFC on the basis of the manufacturer's ordinary selling expense and the cost of examining, rewrapping, etc.; it being understood that the percentage should be so fixed that the manufacturer will not be permitted to make as much profit on sale of consigned tools as was realized on their original sale."

SALE TO ORIGINAL MAKERS

"If the original manufacturer refuses to purchase, then any other manufacturer should be permitted to take consignment on the same basis.

"If RFC is unable to consign as outlined, then any distributor or dealer should be permitted to take consignment at a percentage of cost which would permit a profit less than the distributor's or dealer's normal profit.

"Outright sale to original manufacturer, some other manufacturer, distributor or dealer at a price negotiated between RFC and the purchaser which will permit less than the normal profit provided it is ascertained that the purchaser has an immediate market for a substantial part of the tools. profit to be permitted should be the same or less than the profit on consign-

SCRAP USED AND SPECIAL TOOLS

"RFC to sell to the original manufacturer, some other manufacturer, distributor or dealer at a price negotiated between RFC and the purchaser. The price should be such as to permit the same profit, or greater profit than that made on the original sale provided it is ascertained that there is no immediate market for a substantial part of the

"Sale to ultimate consumer by RFC at not less than 90 per cent of the cur-rent market price."

One of the most important features of the plan requires that "all tools not liquidated one year after receipt of same by RFC to be broken and scrapped."

New special cutting tools and used standard and special tools "should be broken and scrapped."

INDUSTRY TO MAKE INSPECTION

"The RFC should appoint a committee of representatives of the cutting tool industry who shall be available to inspect and examine the tools. Not less than three, nor more than five members shall be requested by RFC to examine the surplus tools which have come into the possession of the RFC Whenever possible, a representative of the original manufacturer should be a member of the committee called in to view his tools.

"This committee," the Association ates, "shall make a recommendation to RFC as to whether or not the particular tools are new standard tools, or new special tools, or used standard or special tools, and if the tools are found by the committee to be used standard tools or special tools (new or used), then they should immediately broken and scrapped."

THE END

("Digest" continued on page 134)

15 HOLES TO +0000-0.0001" ON A Cleereman JIG BORER

Here is a job that is characteristic of the extreme accuracy of Cleereman Jig Borers.
Fifteen holes, ranging in size from ¼ in. diameter to 1¼ in. diameter, are bored in this fixture. All these holes are bored in proper relation to locating pads on the fixture and in relation to each other to the limit of +0000-0.0001 in. Furthermore, all holes are

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The Cleereman Jig Borer is unsurpassed for extreme accuracy, range of adaptability, and speed of operation. Write for catalogs on Cleereman Jig Borers and Cleereman Drilling Machines.

held accurate for angle when the fixture is rotated



to four positions.



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Machinery & Engineering

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400 WEST MADISON STREET

AFFILIATED WITH

CLEEREMAN MACHINE TOOL CO. MANUFACTURER OF PRECISION MACHINES & DRILLING MACHINES

New Tapping Tapping Requirements

Tougher alloys
Finer Limits
Smoother finish
Longer runs

New Tap Namco Tap Namco Tap meets them meets them

This new "RST" Collapsible Tap retains the design advantages of back supporting chasers their full length on heavy core piece, side supporting by heavy body—stamina for tough alloys.

Ground thread chasers—for fit and finish.

New Feature is positive and instant control at point set for collapsing, no lost motion, and chasers reset to precise diametric adjustment.

RST is a universal, double-duty tool—simply remove handle for revolving spindle machines—a BIG saving in tool investment.

Send for your copy of New Tap and Die Catalog D-42-B. Complete information on automatic taps and dies made especially to serve the higher standards of precision at lower threading costs.



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ACME GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS . SINGLE SPINDLE AUTOMATICS . AUTOMATIC THREADING DIES AND TAPS

Only Carpenter offers this 3-Way Program...



to reduce unit costs by better tooling



SAFER METHOD OF SELECTION.....

A method of tool steel selection that reduces inventories and guides you to the tool steel that will give you maximum tool life for a specific job. Saves tool room time and helps you to plan your tool performance.



Definite help in overcoming hardening troubles, cracking, size change, distortion, and premature service failures that contribute to excessive tool costs and production holdups.





MORE PRODUCTION PER GRIND

First aid procedure for curing toolcaused interruptions to machine output. Tools that stay on the job longer between grinds, mean fewer shutdowns and lower unit costs.

The Carpenter 3-way program makes it easy to get better tooling fast—and bring about savings in tool costs and production costs. War plants found this program a life saver in boosting war output. Now, this same program will help to speed reconversion and bring needed cost reductions.

SELECTION OF TOOL STEEL ON PERFORMANCE The Carpenter Matched Set Method simplifies selection. It guides you to the proper tool steel for each job—the steel that will give you the required combination of properties for maximum production performance.

RECOMMENDED HEAT TREATMENT PROCEDURE Clear, simple, easy-to-follow, printed instructions are provided for heat treating each Carpenter Matched Tool Steel, to get the desired results. Proper heat treatment assures safe hardening and savings in tool making costs.

> CHECK ON TOOL LIFE AND OUTPUT PER GRIND Here is the big opportunity to cut unit costs. Find out which tools and dies need frequent regrinding, or which fail prematurely in ser-

vice. Carpenter Matched Tool Steels can help you lick this condition, and reduce unit costs.

How to get started on this cost reduction program: Send for the Matched Tool Steel Manual. It explains this time-proven plan in detail-contains heat treating instructions for each steel, and includes an 80-page tool index and steel selector that really simplifies production. Write for a copy today on your company letterhead, stating title or position. (Free to tool steel users in U.S.A.)

THE CARPENTER STEEL COMPANY

139 W. Bern St., Reading, Pennsylvania

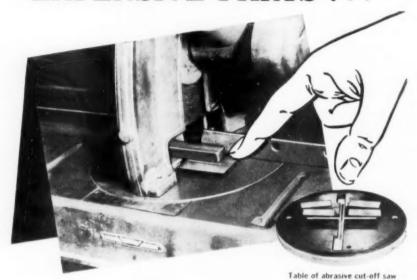




Inserts of WEAR-RESISTANT

KENNAMETAL

CAN OFTEN SALVAGE EXPENSIVE PARTS . . .



recessed for Kennametal inserts

. . . AND PROVIDE A NEW SURFACE THAT OUTWEARS THE ORIGINAL UP TO 100 TIMES

The effective life of many types of machines can be lengthened, and costly shutdowns eliminated, by using Kennametal at strategic points. The illustrations of the abrasive cut-off saw clearly show how standard Kennametal blanks, made primarily for cutting tools, can be used as wear-resistance units. The original surfaces of the saw rest wore quickly, allowing the steel to wobble, causing uneven cut-off. Kennametal inserts, recessed into the table, make a smooth, hard surface of unsurpassed durability.

● The superiority of Kennametal for "specialty" applications comes from a combination of unique properties —amazing hardness (78 Rockwell C), low coefficient of friction, high modulus of elasticity (2 to 3 times that of steel), dimensional stability, and resistance to corrosion and erosion.

Kennametal is available in standard shapes (flat blanks, discs, balls), or it can be accurately molded into special shapes, limited only by reasonable proportions. You can use it profitably in your products, and production machinery. Tell us your wear problem. We will suggest how it may be solved with Kennametal.



(Continued from page 130)

Sees Inventions as Insurance for Metal-Working Prosperity

LOS ANGELES—While some businessmen literally hide from inventors, Wendell Kinney, head of the Kinney Iron Works, Los Angeles, and its numerous subsidiaries, actually seek them—advertising widely for new inventions. He hasn't the least fear of being cornered by fanatics with "screwball ideas", who insist on telling about their "marvelous ideas".

"Inventors—send us your ideas!" is Kinney's continual invitation. And to consider the product of inventive brains, he has assembled a staff of engineers, draftsmen, chemists, metallurgists and technicians. He firmly believes that "new inventive ideas" will prevent a postwar depression in the metal-working industry.

Kinney's plants have expanded vastly during the war, and he is determined to "hang onto" to the ground gained. "New inventions," he believes, is the answer.

At the present time the Kinney Iron Works and its various units have orders ahead for some years to come, according to Kinney. Some of these orders in the company files are from Pacific islands, Asia and the Belgian Congo. But Kinney believes the home demand will be so great after the war that most of his foreign orders will have to wait a year or more.

Recently returned to Los Angeles from a survey of Eastern machine tool and mass manufacturing plants, Kinney believes California's wartime achievements in mass output of war materials has centered world attention on this section.

"Southern California's achievements as a center of new and better production ideas, particularly in the aeronautical and shipbuilding industries, has won for us widespread admiration and respect," he proudly asserts.

The Kinney Iron Works has been a "one-family enterprise" for half a

The Kinney Iron Works has been a "one-family enterprise" for half a century. In recent years, this working plant has expanded vastly, particularly since the beginning of the war. Its subsidiaries now include the National Aircraft Equipment Company, the Vernon Pattern Works, the Standard Steel Corporation, the Kinney Aluminum Company, and eight other subsidiary plants in Southern California.

The company makes everything from small iron, steel and aluminum gadgets for a large industrial patronage in the Western States to the sheetmetal requirements for the Navy and Maritime Commission programs.

A large department of the Kinney Iron Works' subsidiary, the National Aircraft Equipment Company, is devoted exclusively to "postwar planning". When peace comes, the Kinneys expect to build electric ranges, refrigerators, and household gadgets.

This postwar expansion-program has been the company's motivating factor, according to Willard Kinney, in seeking new inventions and inviting inventors to submit their "ideas" for "test-outs".

INDUSTRIAL NEWS DIGEST

Magnesium Industry Ready to Meet Civilian Requirements

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CHICAGO — Without interfering with war requirements, the magnesium industry is now ready to produce for civilian consumption, according to Edwin W. Rouse, Jr., Revere Copper & Brass, Incorporated, and Chairman, postwar planning committee, Magnesium Association.

Speaking at a meeting of the Magnesium Association here, Rouse said that producers of magnesium products can now take care of "both civilian and military requirements."

"Before the war, the production of magnesium was limited, which meant that its use was also limited. However, the government has spent nearly a half billion dollars for wartime production, thus altering the complexion the magnesium industry" he said.

duction, thus altering the complexion of the magnesium industry," he said. "Things have been done that could not have been done before the war, things that were not economically teasible. The prewar situation has been corrected and new opportunities have been opened for magnesium.

Rouse declared that to enable postwar development of magnesium many misconceptions must be dispelled, particularly with respect to the hazard of fire, corrosion and high cost.

"As a matter of fact," he said, "magnesium has no hazard whatever in consumer products. There is no more danger of a magnesium chair burning than there is of one made of steel. Advances during the war have so changed the corrosion factor that it can be said that magnesium is less corrosive than steel.

"Although magnesium prices are the same or higher than for other metals per pound, they cost less per piece. One pound of magnesium will produce five times as many square feet of material as one pound of copper."

INDUSTRIAL BUSINESS NOTES

News of Industry Expansions, Services, and Activities

Service: Expanded customer service is sought by Carboloy Company, Inc., Detroit, in establishing branch offices in Houston and Milwaukee. A. J. Rod will direct the Texas branch and Frank J. Staroba and A. F. Schlumpf will make their headquarters in the Wisconsin branch.

Award: Employees of Fansteel Metallurgical Corporation and its subsidiary, Tantalum Defense Corporation, North Chicago, Ill, have been notified they have been awarded a second star for their Army-Navy "E" pennant.

Safety: Workers in the Whiting Standard Oil of Indiana refinery are safer at work than elsewhere, although they are daily surrounded by millions of gallons of gasoline and toluene for TNT made there. This fact resulted from a survey of statistics collected on

(Continued on page 138)





PRODUCTION PIX OF MASS MANUFACTURING

WHAT'S DOING

Right-A large 26 inch gear ready for hardening in an experimental unit in Tocco's new high frequency induc-tion experimental laboratory. The inductors can be chang-ed for varied sizes of gears.

Said to be the largest laboratory devoted exclusively to induction heating, it will be used for research in hardening, brazing and annealing all metals.

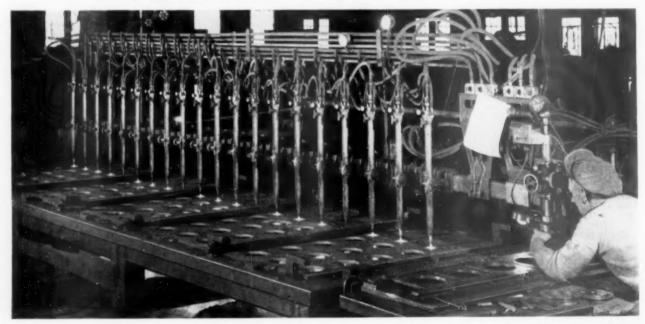




Left-One Hudson Motor Car Company plant in Detroit which turns out fuselage sections and outer wings for the B-29 Super-Fortress is using this pinwheel fixture on production.

Bulkheads shown in production for the Superfortress pressurized cabins indicate the tremendous size of the fuselage sections.

Twenty torches in unique array, working in unison on an oxygraph, speed flame-cutting of steel plate at By-Products Steel Corporation, Division of Lukens Steel Company.





It is reported that

So tough is one new kind of glass that a searchlight lens made of it resists the heat of an 800 million candlepower lamp even though snow falls on the outside. "Tuf-flex", Libby-Owens-Ford.

get ready with CONE for tomorrow

Thermite (as used in incendiary bombs) has been applied to the demolition of metal structures. Mc-Graw-Hill Overseas Digest.

get ready with CONE for tomorrow

A new magnetic floor sweeper for factories looks like a lawn mower and picks up nails, scrap, small parts, and tools. Stearns Magnetic Mfg. Co., Milwaukee.

get ready with CONE for tomorrow

One of our aircraft manufacturers has complete plans for fitting a new fuselage, with luxurious interior, to the wings and engines of war-time bombers. Consolidated Vultee Aircraft Corporation.

get ready with CONE for tomorrow

In a newly-designed twelve-story parking garage, a single attendant can put away or bring out any one of 110 automobiles by merely pushing a button. Park-O-Mat Co., Los Angeles.

get ready with CONE for tomorrow

Plans are well advanced for annual trade fairs, on the European plan, in several American cities. Bureau of Foreign and Domestic Commerce, Washington, D. C.

get ready with CONE for tomorrow

Two hundred police chiefs recently witnessed a demonstration of a tiny radio receiver about the size of a pack of playing cards. Hytron Corporation, Salem, Mass.

get ready with CONE for tomorrow

The "Axonograph" is a device that photographically produces an axonometric drawing directly from a blueprint. Glenn L. Martin Co., Baltimore.

One manufacturer of electric appliances is already displaying his post-war models in order to gauge public tastes and preferences. Proctor Electric Co., Philadelphia.

get ready with GONE for tomorrow

"Fly-it-yourself" service is being planned on a basis similar to that of the familiar rented automobile service. R. S. Robie, Boston.

get ready with CONE for tomorrow

A "slot-machine" mail box accepts payment, stamps a letter and holds it for collection. "Mailomat", Pitney-Bowes, Stamford, Conn.

get ready with CONE for tomorrow

A new molding plastic is nonorganic and will stand heat to 420° centigrade. Mycatex Corp., Clifton, N. J.

A new chemical, when sprayed on the soil of gardens, is absorbed by the plant and kills many insects and fungi. By this means potato crops are said to have been increased as much as 40 bushels per acre. Rohm and Haas Co.

get ready with CONE for tomorrow

A prominent scientist states that he believes that a temperature of absolute zero (-273.1° C.) may soon be attained. *Prof. Peter Debye*, *Cornell Univ.*

get ready with CONE for tomorrow

The new space-saving square milk bottles are already in use by one dairy. Sanitary Farm Dairies, Cedar Rapids, Iowa.

get ready with CONE for tomorrow

An electric motor has been built that develops 30 horsepower and weighs only 57 pounds. General Electric Co.

get ready with CONE for tomorrow

Paper forms for poured concrete are being used. Sonoco Products Co., Hartsville, S. C.





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"The process is to some so spectacular that they refuse to believe their own eyes" — so writes the chief tool research engineer for one of the largest aircraft corporations. Previous cutting costs are radically reduced, difficult and slow cutting of certain materials made swift, easy and safe. By all means write for your copy of "FRICTION SAWING" by Arthur A. Schwartz, Chief Tool Research Engineer, Bell Aircraft Corporation which will soon be off the press. It's free.



Write for Your Copy

THE TANNEWITZ WORKS GRAND RAPIDS

(Continued from page 135)

off duty accidents. There were 16 disabling accidents at the refinery and 56 off duty mishaps.

Purchase: A. J. Conn, LaSalle Designing Company President, announces purchase of the interests of of his two partners, Albert S. Gaines and A. Y. Snide. The firm is in Chicago.

Radios: Stewart - Warner Corporation, Chicago, will be shipping civilian radios within 60 days after restrictions are lifted, Frank A. Hiter, Senior Vice President reports. Production will be in what is now reputedly the world's largest privately-owned fuze plant.

So Sorry: Graham-Paige Motors, Detroit, hasn't overlooked the monkey men of Nippon. The firm is now volume producing master connecting rods for superbombers on the Tokyo turnpike.

Tongmen: Heppenstall Company, Pittsburgh, is mass producing automatic tongs for handling 8" shells. The tongs are used to handle shells from start to finish.

Information: Inside dope for tool and die executives is contained in a bi-weekly News Letter edited by National Tool & Die Manufacturers Association, Cleveland. Industry doings, advances and the political picture furnish themes.

Allocation: Dwindling stockpiles of lead point to possibility of allocation by the Tin, Lead and Zinc Division. WPB. During 1941 producers set aside a portion of their production for essential needs. This was discontinued in June 1942 when supplies increased. Imports will continue.

Appeal: National Tool Company, Cleveland, through President S. J. Kornhauser, has requested that the armed services release a few key shopmen, whose absence has meant his company has been unable to maintain schedules for cutting tools.

Robots: Jet-propelled destruction from American industry to Germany and Japan is in production. Willy-Overland's aviation division is mass producing "buzz bombs" of American design. Range of the robots is 150 miles.

Transfer: Consolidation of company activities resulted in transfer of Aircraft Development Division, from Fisher Body Division to Allison Division, according to C. E. Wilson, General Motors President. The transferred section is headed by Don Berlin.

Branch: West Coast customers of Chicago-Latrobe Twist Drill Works may now look to Los Angeles for service and supplies. The firm has opened a branch office and warehouse under direction of J. C. Malugen, assisted by Herbert L. Braun, Field Engineer.

Recognition: A fifth white star for

hs Army-Navy "E" flag has been won by Standard Steel Works Division, Bahdwin Locomotive Company. The original award was made September 1941, before Pearl Harbor.

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Efficiency: Moving toward Pacific Coast, South American, Oriental and South Pacific postwar markets, Dresser Industries, Inc., is preparing a \$100,000 expansion at Los Angeles. The facility will house engineering, administration and sales office, according to President H. N. Mallon. The expansion is in line with company policy of efficiency, he said. Dresser manufactures machine tools, material and accessories for gas and oil industries.

Convention: A double-barreled convention held by Murchey Machine & Tool Company of Detroit acquainted 100 delegates with the firms tine of tools and with postwar markets. Banquet speaker was Wm. H. Leininger, Detroit industrialist.

Packages: Frequency of purchases was index to Carboloy Company, Inc., Detroit, in making up ready-to-ship packages of standard tools and tips. The packaging system was installed to permit speedy handling of quantity orders.

Producer: Titan Metal Manufacturing Company, Bellefonte, Penna., is now operating its new brass rod mill,

W. W. Seig, General Manager, reports. The factory, erected in record time, was financed by Defense Plant Corporation as a part of a \$1,500,000 expansion program.

Removal: DeVilbiss Company reports removal of its Cincinnati District Sales Office to 410 American Building to employ larger facilities for customers in the area.

Consolidation: Streamlining for postwar production, York Corporation, Philadelphia, will reduce by 25 per cent the number of refrigeration and air conditioning units it manufactures, according to W. S. Stair, Product Development Director. There are more than 400 items, not counting parts, in the production picture now.

Application: Solid tungsten carbide broaches made from Willey's Metal in diameters .250 to 1" are being made by Willey's Carbide Tool Company, Detroit.

Citation: Jenkins Bros. employees at Bridgeport now fly an Army-Navy "E" flag with four white stars. Presentation was made by Lieutenant Commander G. S. Barker, U. S. Navy.

Purchaser: Allegheny Ludlum Steel Corporation has purchased from National Refining Company property in St. Louis. The steel company has occupied the premises as tenant. The property houses district offices and a warehouse. Remodeling plans are being drawn.

Synthetics: Five synthetic rubber pilot plants should reach completion shortly after the first of the year, according to Blaw-Knox Company, designers and engineer-contractors. The plants are for improving automobile tire and other elastomers.

Tennessee: Allen Billmyre Company, Mamaroneck, N. Y., reports appointment of Johnson & Scott, Memphis, as representatives for Tennessee.

Winner: Award of the Army-Navy "E" pennant to Plant No. 1, Aeroil Burner Company, West New York, N. J., is announced.

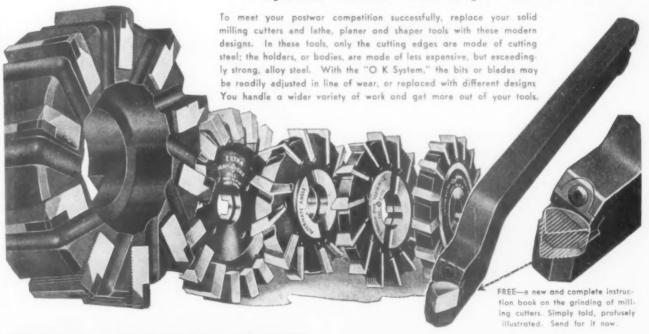
Inventories: Surplus War Property Administration reports it holds surplus war materials equal to \$708,690,000 figured at close of business October 31. During October the SWPA disposed of \$26,772,000 of war surpluses at 64.7 of cost or appraised value. The War Department is the biggest customer.

Building: Adequate provision for immediate war requirements caused Signode Steel Strapping Company, Chicago, to start building a plant adjacent to their present plant. The new building will house 40,000 square feet of space.

THE END

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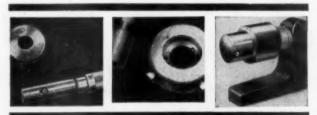
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CAPITAL COMMUNIQUE

T. N. SANDIFER

Special dispatch from The Bramson Publishing Company's Correspondent in the nation's capital

WASHINGTON Design changes rank high in causes of critical munitions shortages With more than one fifth of vital war production monthly classed as "critical" Government agencies and industry spokesmen have attempted to assay the trouble. Design changes were found ahead of either labor shortages or lack of facilities, and ranking only behind the sharply increased requirements of certain items, as the reason

for current lags.

Yet, it is clearly understood here, conditions make it next to impossible to avoid these changes. Tanks are one of the principal production headaches in this respect. And the changes go back to battlefield experience. The Army decided it needed a bigger gun in its medium tank-instead of the 75 mm. which it carried into earlier battles, experience showed that a 76 mm, and even a 105 mm, howitzer was needed. With heavier armament, greater mobility also was desired.

RADICAL CHANGES IN TANKS

With heavier guns, a wider track was seemed advisable. The need of the deemed advisable. wider track, the use of a new-type suspension, and lag in actual output of heavier caliber guns involved, are all factors in curtailing the number of tanks going to the front. This, rather than the fact that a demand has now come for doubling tank output over the figure deemed sufficient earlier in the year, is the delay, although numbers also have plenty to do with it.

About the time the Army discovered it needed more firepower from its tanks. it also decided it needed a bigger caliber shell, or rather a very much larger number of heaviest shells. This is not the same thing as a change in design, but the effect is similar. It takes more than 40 separate machines, with as many different operations, to make a

155 mm shell.

LACKING IN "KNOW-HOW"

It is a question of new facilities and also additional tooling up, with emphasis on getting the tools; especially hydraulic equipment, motors, gears and electrical controls. Another difficulty is lack of experience. Companies that have made stoves, construction machinery and other such equipment, which have been drawn into production of heavy shells, are expected to have trouble. One expedient which will be tried will be to use skilled arsenal personnel from the Army's own establishments to train less experienced workers.

This is a fairly narrow view of the production problem now plaguing Washington. Back of some of the

obstacles mentioned are difficulties in getting components, which in turn may involve manpower in one place; a plant shortage somewhere else. When the Army decided to plaster German lines with the heaviest slugs, for instance, it ran into Navy territory-Navy uses big stuff habitually, and has had some-what the same difficulties, including the necessity of drawing in new, less experienced producers.

PROBLEMS WITH "NEW STUFF"

The new use of rockets, especially by the Navy, is another case. This is new stuff, and tooling up of plants is a major factor. The Army program cuts in here, as electric motors, conveyers, compressors, hydraunc equipm nt, etc., are likewise needed for rocket production. Manpower difficulties run through many of the plant situations. What the new draft regulations will do in this instance remains to be seen in the coming weeks.

In the effort to make up deficiency of one or another kind, some switching of production has taken place. ordnance plant which was closed out some time ago was put back into production on certain combat wire, and there have been enlargements of other

facilities on critical items.

PRODUCTION EMPHASIS RETURNS

On the whole, it is a much different atmosphere here from that of late Sum-As noted in a previous issue, there has been a resurgent emphasis on production, rather than what to do with surplus. In fact, all the tubthumping heard today is on how much, and not what to do with the surplus. It is actually the official line not to mention surplus any more, but the old preoccupation crops up anyway, here and there.

The Reconstruction Finance Corporation it has become known, is acquiring space in a number of industrial centers, where it is planned to pool surplus equipment for speedy utilization. This applies to tools needed in present output, it is said. War Production will have first call on all excess materiel thus brought together.

The warehouse plan, is in line with projects discussed here from time to time, to facilitate clearance of production space when present equipment is no longer being used, and to meet the admitted shortage of normal storage facilities. Existing warehouse space is being used where it can be had, but it is also stated officially now, that RFC is building warehouse facilities where necessary.

Concurrently, the Smaller War Plants Corporation has kept abreast of machine tool excess that might become available for its own purposes. believes that "not more than 20 per cent" of machines leased to operators will be purchased by current lessors. In visualizes the necessity of distributing machines released by larger companies to smaller metal-working plants and in new shops. It anticipates that some of the latter may be launched by returning service men perhaps with as sistance of provisions in the purple property bill.

In any case, the Corporation state there is a keen interest by smalle manufacturers in government-owned machine tools and is now pointing on that smaller plants provide the space in which to put these machines for proper care and continued use.

MINOR PLANTS MODERNIZATION

The Smaller War Plants Corporation philosophy is that the best way to recover any substantial return from the present \$3 billion Government in vestment in machine tools is to facilitate placing extras in minor plants. Its argument is that the average small plant machine tool is 15 years old, and a fairly large proportion, 30 years old Consequences have been heavier production costs for these plants, lower productivity and lack of financial suc-

Putting modern Government machinery in such manufacturers' hands the Corporation believes, will introduce faster feeds, deeper cuts and closer tol-erances. It would spread the gospel of newer and better machinery in these places, and likely create additional demands for newer machines.

SURVEY OF SMALLER PLANTS

Economic gain of this private plants rehabilitation has led them to urge that a policy of lower prices than now contemplated, and that if it will help move the machines, they be sold "without too much haggling over terms," as one

official put it.

As support for its position the SWPC refers to a survey conducted among 212 smaller plants in Wayne County, Mich., engaged in metal-working, machinery and transportation equipment The purpose was to learn potential demand from these plants for tools. It showed, according to preliminary findings, that about 60 per cents of small manufacturers plan to acquire surplus Government-owned tools for postwar production; about 50 per cent of the above number will have to finance their purchases either by loans or deferred payments and about 50 per cent of those which will need financing for their purchases will try, or hope to get credit, from a Government agency.

CASH SALES DOUBTED

The Corporation is inclined to discount plans of those who indicate now that they expect to pay cash for their Taxes, renegotiations and delayed settlement of terminated contracts may leave such manufacturers with smaller cash balances than they now anticipate.

The Detroit sampling also showed that smaller plants own on an average, 30 machine tools apiece. Those planning to augment their equipment say they want an average of about 10 tools each, and they hope to trade in an average of five of their present tools as part payment.

CAPITAL COMMUNIQUE

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Another discovery, if Detroit is a sample, is that surplus tools will have to be publicized more widely. Only slightly more than half the plants surveyed in Wayne county are aware of the present Government procedure for handling tools. Most plant officials indicated they thought they could apply to purchase "through some Gov-ernment agency" but the fact is many do not know where or how to locate surplus tools.

CONGRESS MAY BOLSTER SWPC

Some emphasis is put on the Corporation's ideas here, because a Congressional bill is being pushed, which would in effect, give this corporation some of the scope now enjoyed only by the Reconstruction Finance Corpora-tion, so far as the SWPC's relation to helping small plants is involved. This legislation would greatly broaden financial backing and capacity of the Corporation, so that its ideas and its findings may have some transmission into action later on.

On this general line, the Reconstruction Finance Corporation has just fin-ished totaling its proceeds from the first large-scale public auction of Gov-ernment-owned tools, which was held near Washington in November. The largest single sale brought the Gov-ernment \$7700 for a 350-ton capacity press, while the smallest sale was for \$5, to a mechanic who bought a drill. The total realized from some 450 machine tools, which had been used on Navy work, and ranged from 25 to 40 years old, was \$287,000.

FIRST RFC SALE SUCCESSFUL

Conceding that much of this was obviously old stuff, the RFC's interest was not only in the amount realized, but in the showing first, that there is a demand for this equipment, and particularly, that individuals are interested in buying some of this stock. In any case, they termed the sale "highly successful" although no comparison of costs with returns was issued.

Not so much is heard lately about shipments abroad, but Army officials have recently returned from a preliminary survey of devastation of industrial plants in Russia. Their report is significant of what replacement will be needed if much of this plant is to be restored to working order in that country, not to mention other liberated countries also visited. Not only has much equipment been purposely ruined, but an undetermined amount removed by the Germans. In one area, among other destruction, were seven metal-

RUINATION IN WAR ZONES

In another area, where a particularly large metallurgical installation was ruined, the Russians had attempted to render the plant useless by taking with them certain vital equipment. On their return, they found the Germans had converted a steel blooming mill to manufacture artillery shells, but then, in leaving in turn, they simply demolished the machinery past repair.

More detailed reports along this line are now expected as the American and associated forces get further into the former occupied zones. THE END





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This new Micromatic Hydrohoner is a high speed production model, designed to produce large quantities of high precision parts. It may be used in multiple or progressive honing within uniform size limits (maximum) of .0003", on parts such as these:

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Variations in error which usually occur in production are corrected in straight run honing. Uniform size is automatically generated through the Micromatic Microsize Control—a positive, fully automatic method of generating uniform size.

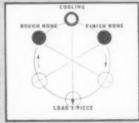
Each spindle has its own individual Microsize Control, so that any desired combination in multiple or progressive honing may be set up.



Three typical set ups are illustrated below:



THREE OPERATIONS. Progressive Roning Operations permit maximum stock removal per unit of time. Usually recommended for maximum stock removal ranging from .007 in ¼" diameter bores to .010 in 1" diameter bores.



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FILMS

give **Conversion Hints**

Movies That May Help You Meet Your Postwar Competition



THERE will be more to conversion than pushing unwanted machines into a warehouse. Is your company going to produce pre-war models or is it going into an entirely new field? Which of your personnel are you planning on keeping to incorporate into your organization and which are you going to drop? What plans have you made to handle surplus materials glutting your storage space when the order "Cease Production" is passed down the line?

Answers to these and many other questions common to the mass production fields have already been solved and originators of schemes and plans are willing to share their knowledge through the medium of movies. You won't always agree and this is as it should be.

A sizeable number of excellent, thought-provoking films are available for study by engineers and executives. The short time it takes to find out visually what the other fellow is doing may be a valuable investment.

Welding Provides Theme For Industrial Film

• "New Horizons in Welding": A complete story of production welding deal-



Mountains of supplies crowded factory when contract was cancelled before completion.

ing primarily with setups and picturing step-by-step procedure followed where welding is used on a production

Incorporating many sidelights, the film is introduced by depicting phe-nomenal growth of arc welding from an implement of repair to a mass pro-duction tool. Laboratory scenes show exhaustive tests used to determine compatibility of metal and electrode.

Shown also are scenes in a large manufacturing plant where more than 10,000 items figure in the welding scheme of things. All-welded fabrication represents the ultimate in welding applications. Sequences are devoted to this goal.

Another highlight is a portrayal of the arc timing mechanism in action. The device is capable of cost, production, procedure and quality controls.

Running time is 30 minutes. Size of

the film is 16 mm., with sound. Write: Harnischfeger Corporation, Welding Division, 4400 West National Ave., Milwaukee 14, Wisconsin.

Movie Studies Problem Of War Surpluses

• "The Aftermath of War Production": A motion picture study of surplus war materials disposal based on two typical examples-a tank contract and a bomber contract-both of which were cancelled before completion.

Analysis of problems of orderly disposal of surplus materials and equipment is made in the film, in an effort to graphically portray what can happen when the enemy surrenders and con-tracts are cancelled wholesale.

The element of cost, in the decision as to what should be scrapped, what should be adapted to peacetime use. which tools and materials have "standby" value and which have no foreseeable peacetime use is also considered in the picture.

The 17- minute picture is a shortcut to an understanding of one of the biggest reconversion problems facing industry which has been engaged in pro-

Martian workmen apply themselves to provide action for movie sequence on industrial welding.





duction for war. The new and dramatic plan is available in 16 mm, size and is equipped with sound track,

Write: Automotive Council for War Production, 320 New Center Bldg., Detroit 2, Michigan.

Mass Production Tooling Problems Depicted

Tooling for Better Internal Grinding": Thorough coverage of many problems encountered in the tool room and in mass production. Answers to special problems for engineers, tool and fixture designers, executives and production men include the importance of universal tooling for small lot production, standard tooling adapted to production work and special tooling to enable combining several operations at one chucking.

The film is instructional and not designed as a primary training aid for learners; it is rather a production that will interest and instruct men who are experts in the field of internal grinding.

The film is produced in full koda-chrome on 16 mm. size, with sound. Projection time is 40 minutes.
Write: Bryant Chucking Grinder

Company, Springfield, Vermont,

Color Captures Thrilling Sequences in Steel

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o"Steel Man's Servant": Capturing the drama of steel making from the time the raw ore leaves the mine until the finished product leaves the mills, this film was 10 weeks in photographing. Purpose of the movie is to acquaint the nation with the wonders of one of the world's greatest industries.

Graphically shown in full technicolor are activities that go into production of this engineering material; how it is handled to make bridge steel; treatment necessary to produce everything from carpet tacks to all-steel trains; processes to produce steel for safer automobiles and stronger wire fences.

Edwin C. Hill is narrator and a special musical score was produced py Robert Armbruster. Hollywood technicians did the filming. U. S. Steel employees at their daily tasks provided the acting.

Available in two sizes: 16 mm., with sound-running time 43 minutes and 35 mm. also with sound-projection time 38 minutes.

Write: United States Steel Corporation of Delaware, 436 Seventh Avenue, Pittsburgh 30, Penna.

Reconversion Shortcuts Detailed by Gorton

• "An Exact Duplicate": Short cuts to postwar production problems provides theme for an industrial movie of unusual appeal. Carefully edited, the movie was a year in the making. jobs depicted taken from actual machine shops and production lines.

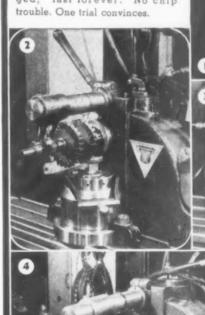
Color and sound augment showing of new techniques in Tracer-Controlled milling, engraving, and duplicating.

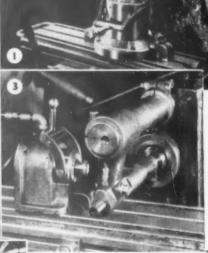
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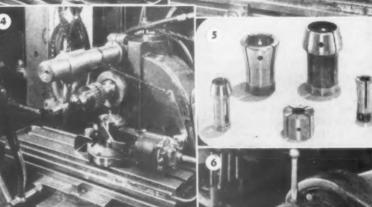


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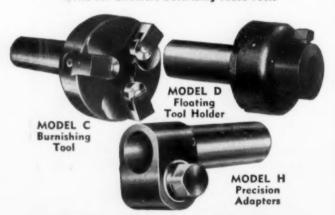
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"3/8-16-4 flute bottoming tap for magnesium. This (Sossner) tap gave us a record run of 11,552 holes. I had the tap inspected before running. This finish is much higher than I find in the usual run of taps. And I believe that the success of the tap was largely due to this fact."

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MACHINE TOOLS

... news and trends in the Machine Tool Industry . . .

More Unrated Orders Filled as October Shipments Rise

For the third successive month machine tool shipments bounded upward when new units turned out during October showed a substantial 3.4 percent increase over those produced during the preseding month.

the preceding month.

WPB statisticians, basing their figures on reports from 199 concerns in the industry, have announced that the increased October shipments repsented a boost of \$1,224,000 over the value of September shipments.

Net new firm orders (total orders less cancellations) received by the concerns reporting totaled \$56,521,000. This was an increase of \$23,369,000, or 70.5 percent over September's figures.

The backlog is again piling up, it was reported, with an increase of 9.9 percent. The total industry backlog, WPB figured rose to \$213,392,000 by the end of October. At the present rate of shipments, it will take the builders a full six months to clear their order books.

Most interesting and significant detail buried in the WPB statistics was the revelation that of the total backlog approximately \$25,716,400 is represented by unrated orders. These, of course are largely postwar machine tool requirements. Upward of 90 percent of this total, various trade sources indicate, was placed by reconversion-conscious automobile makers from Detroit. General Motors still remains by far the juiciest plum in the industry's immediate postwar market.

An interesting trend during October was a marked increase in shipments on these unrated orders. This, WPB Tools Division men said, was a result of amendments to Order E-1-b in October, which eliminated the necessity for ratings on machine tool purchase orders, provided they do not interfere with rated orders, and also permitted unrated orders to share in the percentage of production set aside for non-military output, as well as the provisions on priorities Regulation 24, governing purchase of machine tools for

(Continued on facing page)

Will Builders Service Surplus Machines Tools?

R. G. HASKINS

MUCH has been written and even more declaimed concerning the postwar conditions facing the machine tool industry. Few really understand these problems—too many (as far as the ideas expressed are concerned) seem unfamiliar with the subject.

Most have merely touched on one

Most have merely touched on one angle of this problem with which some concerns have been confronted during the last six months. This is the problem of giving service and engineering help on the machines being resold by the Government Services and in particular by the Defense Plant Corporation.

It has always been, and we hope will continue to be, the policy of our company to give service and engineering advice at no charge to users of Haskins machine tools, regardless of the age of the machine or how the user came into possession of the equipment.

We, of course, had never anticipated the condition we now face with reference to the government loaning, leasing or reselling large quantities of surplus machine tools, including many machines of our manufacture.

SERVICE PAYS DIVIDENDS

We have always found under peacetime conditions that our policy along service lines paid dividends. In most cases the good-will created and excellent results on production obtained, because of our service policy, led to the sale of additional new machines. These prospects exist in the case of the new owners who are purchasing equipment from the Government.

However, due to the lack of the intelligent handling of the redistribution of equipment by government men in charge of the disposal of excess machine tools, we are faced with a very unfavorable reaction.

Most of the machines turned back to the Government by prime and subcontractors are machines that have had the most usage and are in the worst A prominent builder cites problems posed in rendering service and engineering help on re-sold government-owned machine tools



R. G. Haskins, builder of precision tapping equipment, says machine tools purchased "as is" from government surpluses are not bargains. Most are badly worn, and many must be rebuilt.

condition. Much of this equipment has been in service 20 hours a day for three or four years, which is equal to about 10 years normal service.

Even of greater concern is the fact that in too many cases these machines have been in the hands of unskilled operators who were not trained in the care of precision tools. Some of the machines sent in to us for inspection have had to be completely rebuilt.

The machines were sold by the Government "as is". The new owner did not want to buy a used machine, but of necessity had to do so from the Government as he could not get a priority as long as there were machine tools of this particular type in the Government's surplus stock. The prices

paid for these used machines are not in any sense bargain prices.

In many cases, due to war regulations governing the manufacture of electric motors, single voltage motors had to be furnished on the original machines. The used equipment is being sold without regard to the electrical specifications. This necessitates either having the special type of motor originally used rewound, or new stators of the required voltage purchased if available.

Fortunately we have been able to satisfy a large portion of the purchasers of these used, mistreated machines.

BELIEVES SOLUTION POSSIBLE

As a result, the operational cost of our service department is increasing to a point where, if this situation continues or increases materially, due to the priority restrictions being prolonged, our normal profit resulting after renegotiation will be used up before we have passed through the reconversion period following "V" Day.

I have not tried to cover this subject in full. Further, I have not discussed

I have not tried to cover this subject in full. Further, I have not discussed the recommendations we have made to the Government Agencies handling the surplus machine tools, nor the method of cooperation we have offered them. I have tried to present a thumbnail sketch of a little discussed problem that all machine tool builders, making a standard commercial machine and having a liberal service policy, are being forced to meet.

I sincerely believe, however, that the machine tool industry will eventually work out a satisfactory solution. Certainly an industry that so successfully met the challenge to produce machine tools for war production in sufficient quantities back in 1941 and 1942 will not long permit a problem such as this interfere with their successful operation.

We may be considered the "forgotten industry" now that war industry is fully equipped with machine tools, but rest assured that the prewar members of the industry will survive in spite of the difficult road we are now forced to travel.

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Big news was the fact that unrated alignments during the month were valued at \$421,000, compared with a total of only \$24,100 in September.

Amended WPB Order Permits Any Color on New Machines

WASHINGTON — Relaxing slightly as restrictions on finishes for machine mols, the WPB Tools Division has amended its Limitation Order L-108 to permit builders to paint new equipment any color desired by the purchaser.

The color restrictions on machine tools, first imposed by WPB in May, 1942, limited final paint, enamel or lacquer coatings to "old machine-tool gray", notwithstanding customers' requests for lighter colors.

Manpower savings involved in the amended limitation order justifies its retention until "Victory in Europe" Day, WPB officials said. The amended order continues to restrict the number of coats of paint, permitting the application of only one coat of primer or sealer, and not more than two coats of paint, enamel or lacquer.

The order does not permit the application of filler to smooth out irregular-

ities in metal surfaces.

Real news in the order is the fact that builders can now satisfy the demands of the growing number of production men who are utilizing color contrast painting and light colors on machine tools.

WPB Asks Labor Cooperation in Machine Tool Production

WASHINGTON — Pointing to the urgent need for early production of approximately 6,000 machine tools to meet the expanded mortar and medium and heavy artillery ammunition programs, Government officials called for labor's cooperation at a December meeting of the Machine Tool Labor Advisory Committee.

No substantial additional need for machine tools to expedite production of critically needed small arms ammunition is expected, officials explained, because facilities already exist.

Explaining the critical manpower situation, WPB officials suggested that shops producing less urgently needed machine loan skilled men to builders manufacturing equipment needed to meet the mortar and shell programs.

meet the mortar and shell programs.

Cheering news was the WPB report that the Army is considering the release of some men to machine tool shops.

FILMS

(Concluded from page 147)

Engineering staffs in charge of production of the film have included newest developments and feel that they have included many an answer to problems now on the drawing boards.

Sound commentary clearly describes each operation and enables those not familiar with operation of Tracer-Controlled machines to understand applications.

Available in 16 mm. in sound and color. Projection time is 30 minutes.
Write: George Gorton Machine Company, 1110 Racine Street, Racine, Wisconsin.



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- 6. Closely synchronize various motions, operations or functions?
- 7. Apply light... or heavy ... forces at extremely high velocities through either long or short distances of travel?

- 8. Obtain continuous automatic reversing drives at constant R.P.M. or over a wide range of speed variation?
- Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
- 10. Obtain constant horsepower output through all or part of a speed range?
- 11. Obtain automatic torque control?
- 12. Obtain accurately matched speed of various rotating elements?
- 13. Obtain constant speed output from a variable speed input?
- 14. Obtain full preset automatic control, elimination of problems of shock, vibration, etc.?

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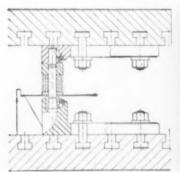
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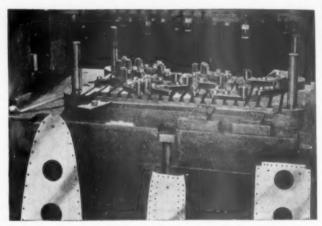
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Side view showing conexample of perforated and

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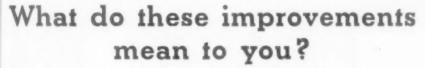
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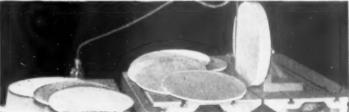
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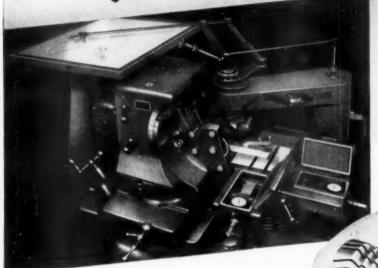
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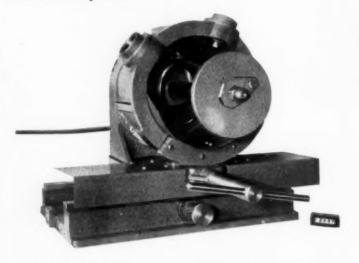
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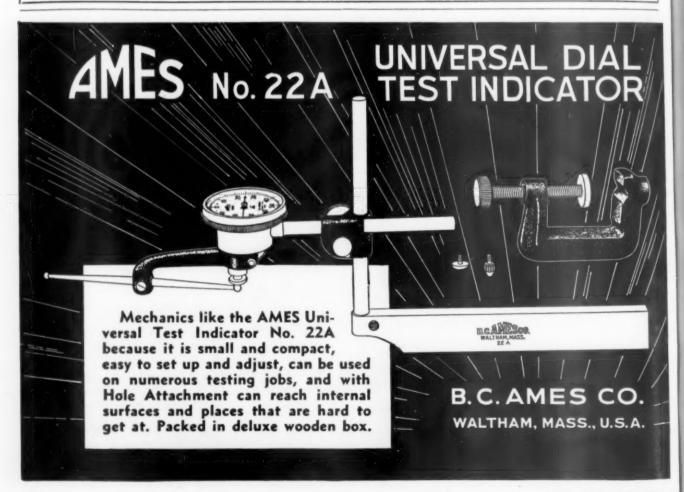
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Shells are manually loaded from a conveyor. Locating for length is automatic from boat tail end by a spring cam and a positive stop. Chucks holding parts close automatically and by means of a clutch mechanism, rotation of chucks is started.

When cycle is started, the spindle carrying the roughing, finishing and facing tools is fed by means of a cam to correct depth. Operations are com-pleted after 34 revolution of machine. When hole is complete and tool withdrawn, rotation of machine is stopped and the clutch opens to eject shell on a conveyor. All operations are automatic.

The machine was timed to produce 250 finished shells per hour. Feed is .007" per revolution at 750 RPM. Spindles operate at 650 RPM and chucks at 100 RPM. Elapsed time for a cycle is 84 seconds. Machine weight is 18,660 pounds.

WAR NEEDS DICTATE 19711 USE OF PRECISE GAGES

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The utility gage is designed to close



Gage has many uses

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and rigid adjustments, yet all dimensional points are adjustable rapidly and precisely. General design is conventional. All mechanical movements and adjustments are simple and direct.

Thread contacts are established under uniform spring tensions between two annular thread rolls, supported by a rigid and adjustable backstop. The universally accepted Pratt & Whitney "J-S" annular thread rolls are used. All

dimensional variations of lead, pitchdiameter, angle, out-of-roundness and straightness are cumulatively recorded on the dial indicator by a direct metal-to-metal contact, precluding possibility of error in transmission.

Accululated interpretations of error immediately establish the acceptability of the checked part, eliminating the element of human judgment.

19721

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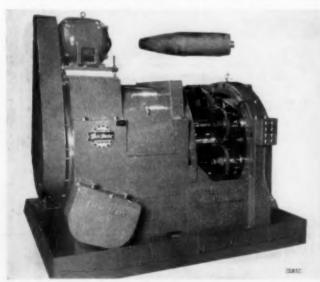
South Bend Lathe Works is marketing a new 9" toolroom lathe for producing a new 9 toolroom lattle for production operations or exacting toolroom work. The lathe has a 9½" swing and takes 22" between centers. It has a maximum collet capacity of ½" and a

34" spindle bore.
Twelve spindle speeds range from 41 to 1270 RPM, with back-gear drive for lower speeds. A quick change gear box permits cutting 48 pitches of screw threads, four to 224 per inch. Also provided are 48 power longitudinal feeds and power cross feeds.

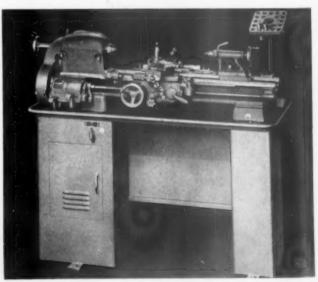
The new lathe is equipped with a handwheel draw-in collect attachment, collet rack, taper attachment, thread dial indicator, large and small face plates, micrometer carriage stop and thread cutting stop.

ROLLER TOP INCREASES USEFULNESS OF HYDRO-TABLE

Seeking greater versatility of their hydraulic elevating table, Lyon-Ray-mond Corporation has added a removable and reversible roller top to their growing list of accessories. The roller growing list of accessories. top consists of rigid, welded frame-work, supporting ball bearing conveyor rollers. Changeover is induction (Continued on page 166) Changeover is instantaneous.



Special machine finishes 155 mm. shells



Firm builds new 9" toolroom lathe



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Q74

MATTHEWS MARKER SAVES HIGHLY FINISHED SURFACES Q75

A short blast of fine grit is used in a newly-developed marking process where delicate and precision parts having a ground or finished surface cannot be marred or distorted. The development is announced by Jas. H. Matthews & Company and is designated as "Airgrit" Marking Unit.

The grit is blown against a rubber or celluloid stencil mask upon which the part to be marked is placed. The desired marking, whether letters, symbols or numbers is cut into the stencil. The result is a clear-cut, light marking.

The unit operates by air pressure and

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is similar to sand-blasting, except that it is constructed for very fine work. Low pressure air is employed. The unit has a timing device for regulating the amount of time of the blast.

PARTS CLEANING SYSTEM Q76 DEVISED FROM TWO WASHERS

Combining utility of two washers into a portable unit, Gray-Mills Company has developed a new parts cleaning system. The system includes a portable cleaner with the "swisher" feature and cold cleaning Flo-Bac solvent.

Small parts may be cleaned in quantity by immersing in solvent by means of a basket. The dipping basket can be made to rest on the hand-operated "swisher", which speeds cleaning operation by providing agitation. Larger

parts, requiring individual handling are cleaned of grease and grime by a strong stream of solvent pumped from the tank below.

Units are portable and provided with a safety-cover to eliminate fire hazards. Flo-Bac solvent is used cold and is reused over and over again by continuous filtering. Two models are available

TRIANGULAR CUTTERS APPLIED TO HOLLOW MILLS

Triangular tool bits have been applied to hollow mills by Weddell Tools.



Hollow mill cutters

Inc. The bits are locked by a single screw. Blades are backed up by single adjusting screws or all may be simultaneously adjusted by one adjusting nut. Shape of the bits provides chip clearance. The hollow mills are furnished with standard blades of high speed steel, carbide tipped or cast alloys. Others for special work are available.

ANGLE PLATE SAVES 50% IN WORK SETUP TIME

A compound angle plate making up to 50 per cent savings in work setup time is announced by Angle Computer Company. It can be used on milling machines, shapers, planers, jig borers, drill presses, etc. for lay out, machine and checking work without moving work from the plate.

The plate will hold work in any po-

The plate will hold work in any position from 0 to 90° in two planes 90° apart and in any position within 360° of the radial axis. Calibration is accomplished through use of two 5" and one 10" protractors, each graduated in half degrees and each with a vernier graduated to one minute and having an accuracy within ten seconds of the arc

SPECIAL HEAT TREATING Q79 PRODUCES LONG-WEARING GAGE

A special heat treating process produces V-nide, a new, long-wearing gage of extreme hardness, according to Republic Gage Company. Hardness of the case is measured at 73 to 75 Rockwell C, but careful drawing reduces brittleness usual to case hardening.

In actual production, the gages thus produced outwear ordinary steel gages eight to 10 times, manufacturer reports. In thread and plug gages users find the same coefficient of expansion as steel, availability in "W" tolerances, extreme hardness of case with a tough core, same "feel" as steel gages, high finish and only slightly higher selling price.

(Continued on page 168)



Marking machine handles delicate precision parts

MULTIPLE SPLINE PROCESSING

Dual Lead Angles Broo

Queries And Answers On Broaching

PRECISION **NUTS NOW** BROACHED

news

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Getting the Most Out of Your Broaches

BROACH RE-SHARPENING

FIRM INTRODUCES AIDS

Three recent developments of interest to small tool users have been announced by Rieger Manufacturing Company. The first of these is the circle cutter employing an adjustable cross-arm for holes 2 to 8" in diamfacer, applicable to drill presses, engine and turret lathes, and milling machines for spot facing, boring, counterboring, valve seating, and cutting convex and concave annular rings. Three standard sizes will make cuts of 1" to 5" diameters. Other sizes are available on special order.



Three recent small tool developments by Rieger

Q80

eter. It holds a ¼ x ¼" tool bit of any desired contour. The tool is for use on lathe, electric drill or drill press. Two standard models, round shank and taper, are available.

Second of the tools is the die holder, built for 1" or 1½" O. D. button dies, with the standard model having a No. 2 Morse taper shank. Other taper and straight shanks are available. Four holes are provided for chip ejection. Manufacturer recommends it for thread chasing on lathes, turret lathes or drill presses having reversible spindle rotation.

Last of the accessories is the Multi-

relopments by Rieger

ORI

COMPANY MAKES NEW

STEEL STRAIGHT EDGES

Taft-Peirce Manufacturing Company is now making a line of steel straight edges of suitable proportions. The tools are hardened, drawn and accurately ground straight and parallel in six sizes from 12" to 72".

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HOLDING FIXTURE CUTS MACHINE SETUP LOST TIME

Challenge Machinery Company has added a shop tested holding fixture to its line. The fixture will reduce setup and loading time on milling machines, boring mills, drill presses, shapers, planers, etc. The fixture is made from special analysis semi-steel and precision machined. Available in three standard sizes.

Q82

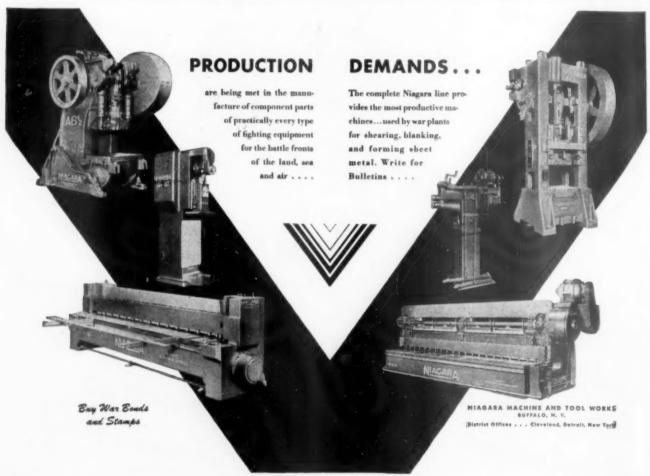
Q81

INSTRUMENT DETECTS MOISTURE IN MATERIALS

Easy determinations of moisture content of wood and other engineering materials is made possible through development of a moisture detector at Colloid Equipment Company, Inc. (Continued on page 170)



For moisture determination



YOUR NO.1 REQUIREMENT IN A CUTTING TOOL

SOURCE



DESIGN ABILITY CONTRIBUTES GREATLY TO **OUTSTANDING TOOL PERFORMANCE!**

To develop cutting tools and methods which suit your own particular needs, Illinois Tool engineers and metallurgists draw upon a vast experience with leading manufacturers in every type of metal working production. Their design recommendations can contribute greatly to cutting tool life and efficiency and to economy in production. Take advantage of this exceptionally creative engineering service . . . bring your cutting tool problems to Illinois Tool.



Overnight to All America . . From the Hub of Air

MEADQUASTERS FOR ENGINEERING CUITING TOOLS

THE RESERVE

ILLINOIS

TOOL WORKS

2501 N. Keeler Avenue, Chicago 39, Illinois In Canada: Canada Illinois Tools, Ltd., Toronto, Ontario

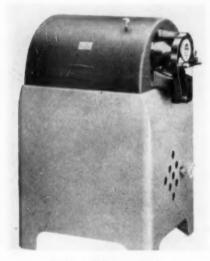
MANUFACTURERS OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS

The instrument employs latest ideas in electric circuits and electronic princi-

Range is from seven to 25% moisture with accuracy of plus or minus one per cent. The unit is self contained and ruggedly constructed.

FIRM DESIGNS NEW (Q84) TUBE HANDLING MACHINE

A completely automatic machine for squaring, burring, flaring and beading ferrous and non-ferrous tubing in sizes from ½" to 3" O. D. is available to industry through Leonard Precision



Tube shaping machine

Products Company. Design and development were dictated by needs of aircraft plants.

Operator places work in machine and presses control button. The machine automatically completes cycle of squaring and burring, flaring or beading. Predetermined specifications can be maintained.

INFORMATION FREE

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LIVE CENTER DAMPS (Q85) GRINDER, LATHE CHATTER

Accuracy and positive elimination of chatter are features of a newly-developed live center made by Falls Products Company. It is intended primarily for use in grinder and lathe tail stocks for replacement of dead centers that fail to stand up under friction of increased speeds and production loads.

increased speeds and production loads. Chattering and eccentricity of rotating point have been major causes of tailure of many live centers. This Falls center is ground in its own bearings after assembly to insure zero eccentricity, makers say.

Removal of internal play and preloading bearings through a threaded retaining ring eliminate chattering. The provision of compensation for bearing wear by tightening retaining ring makes possible sustaining initial preloading and non-chattering rigidity throughout life of the center.



Vise secures work

10861

WORK VISE LOCATES ROUND STOCK ACCURATELY

Accurate cross-center drilling of round stock is one of the many uses for a work holding vise developed by Universal Engineering Company. No moving parts are involved in this operation. Bushings through which drill

passes are interchangeable, giving a wide range in sizes.

The vise will hold hexagon stock as well as round. Clamping action of the vise is the opposed jaw principle, leaving one surface of the work exposed for work.

(Continued on page 172)

INVENTIVENESS CRAFTSMANSHIP and EXPERIENCE

in designing and building special machines and parts

 "That man is most original," said a famous philosopher, "who can adapt from the greatest number of sources."

Operating on this principle, MERZ has not limited the scope of its work to a few standardized items, but serves many industries, designing and manufacturing all types of experimental and "pilot model" equipment, special parts, tools, gages and fixtures of most intricate and com-



plicated designs. Tell us what you need, and get our suggestions.

MERZ standard plug and ring gages, of guaranteed accuracy, and in most wanted sizes, are carried in stock for prompt shipment. Literature mailed on request.

Engineering Company INDIANAPOLIS 7, INDIANA

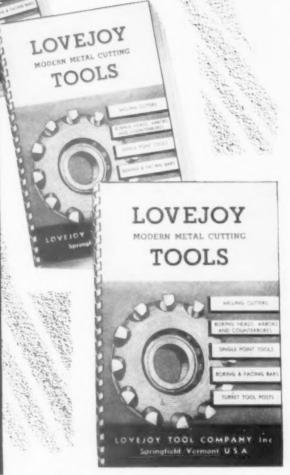


ONE OF THESE IS YOURS FOR THE ASKING!!

The new Lovejoy Tool Catalog has met with an immediate favorable response, because in it is included all data needed for ordering any type of Lovejoy milling cutter, boring head, arbor, counterbore, single point tool, boring and facing bar, and turret tool post.

In it you will find complete descriptions, line drawings, prices, engineering data, hints on grinding, speeds and feeds, etc.

Fill in the coupon today for your free copy.



MAIL THE COUPON TODAY!



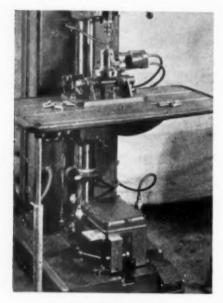
Please sen	d me my	free cop	y of "Lovejoy	Modern Meta	Cutting Tools.
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NAME_____TITLE____

COMPANY

STREET____

TOOL COMPANY, Inc., SPRINGFIELD, VT., U.S.A.



Air holding fixture

PEDAL OPERATES NEW 10871 WORK HOLDING FIXTURE

A work holding fixture developed by Zagar Tool, Inc., is being employed on a Warner & Swasey precision tapping and threading machine. A special mounting tips the fixture 20° for loading and unloading. The operator steps on a treadle, which tilts the holding fixture to load. When treadle is released the fixture returns to vertical position.

A micro-switch starts operating cycle

and machine stops automatically when cycle is complete. The holding fix-ture uses standard 14 AC No. 2 collets. A feature is that the collets close without moving vertically, allowing close tolerances in second operations, such as milling slots, drilling and tapping to depth, counterboring or spot facing.

INFORMATION FREE

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BUILDER MARKETS 1Q881 VARIABLE SPEED DRIVE

Modernization of old machinery or manufacture of new may equally employ to advantage a lari no drive just perfected by Lombard Governor Corporation. The compact unit points to new possibilities of use in medium and higher horsepowers for geared drive power transmission, builders say. Individual control for each machine is possible.

The unit differs from conventional types of speed drives in that a V-belt is used for control medium only, primary speed reduction being accomplished by conventional gearing methods.

BENCH MODEL OFFERS 10891 PRECISION MILLING WORK

Vertical or horizontal milling can be done on a new and improved bench milling machine built by Benchmaster Manufacturing Company. The precision-built machine can be converted from vertical to horizontal with overarm and arbor by interchanging spindle attachments.

In either position the mill is equally adapted to precision tool work, or high speed production by equipping it with a rack and pinion feed.

Jobs suitable to the machine include precision die making, die sinking, jig boring, angle slotting, facing, side milling and key seating. This improved model is heavier and more accurate than previous models.

(Continued on page 174)



Bench milling machine

THE COUNTRY'S AND MOST Many new Putnam end mill items have been added . . . size ranges on others extended . . . so that, today, nowhere will you find so complete a line of end mills as Putnam offers you. And, even more important, all of these standard Putnam Hi-Speed End Mills are available to you right from stock . . . either on dealers' shelves or at our factory . ready to be shipped you immediately on your order. You can depend upon Putnam Hi-Speed End Mills to deliver top cutting performance always. Why be satisfied with less when you can get the best without delay?

> Send for your new 92 pp. Putnam catalog - it's free! Requests must be made on company letterheads.

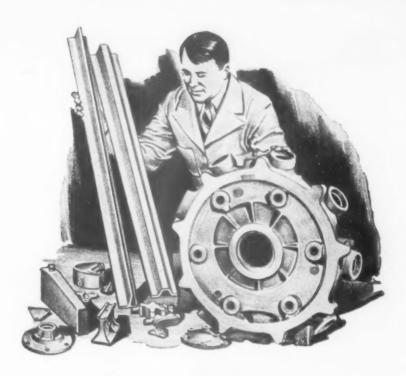




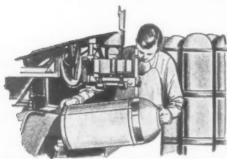
AM TOOL COM 2987 Charlevoix Avenue

Detroit 7, Michigan

Magnesium alloys
are fabricated and joined
by all common methods



and Dow's complete fabrication plants



are always ready to work with you

Downetal Magnesium brings you its incomparable lightness—without equal among structural metals—in the full range of common fabrication methods.

The fruits of more than a quarter-century of Dow engineering and fabrication experience are ready at hand to translate your ideas into new, weight-saving products of Dowmetal—the metal of motion. For in Dow's own shops—and in numerous other plants as well—Dowmetal Magnesium Alloys, with their high strength-weight ratio, show full versatility in sand, permanent mold and die casting; sheet, plate and strip rolling; rod, bar, tube and special

shape extrusion; press and hammer forging—and bending, drawing, pressing, spinning, blanking, punching and shearing.

Likewise Dowmetal is readily joined by all usual procedures—riveting and arc, spot, gas and flash welding.

There is no mystery to magnesium processing techniques: These lightweight alloys call for procedures very similar to those employed with other metals.

Skilled technical advisers await your call at the nearest Dow office, to help work out the best way to use Dowmetal in your own product.



JANUARY, 1945

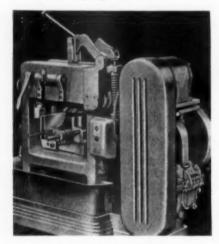
173

MECHANICAL SAW HAS NEW PRECISION FEATURES

Full mechanical drive, finger-tip control and four-sided saw-frame performance are claimed for the new mechanical saw introduced by Peerless Machine Company. The saw cuts at higher speeds with absolute precision and is convertible to manually operated conveyor operation on the job. Available in capacities of 7 x 7", 11 x 11" and 14 x 14".

(Q90)

A new feature is compensating feed unit, involving a sensitive rack and pinion to compensate for hard spots in work and varying shapes.



Saw operates faster

INFORMATION FREE

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19911

SOLID WHEELS AID IN POLISHING PROBLEMS

A line of solid polishing wheels will be marketed by Norton Company under the tradename of Norflex. Available in three types-resilient rubber, cork resinoid and fiber resinoid-they



Solid polishing wheels

meet requirements of a wide range of finishing, de-burring and polishing operations

All three types are similar in that they possess a relatively soft and flexible bond that imparts a cushioning effect to insure smooth finishes. They dif-fer from ordinary wheels in that the Norflex line is designed to remove a minimum of stock. Each type has its own field of usefulness.

SEPARATE CUTTERS FEATURE MIDGET BARS

(9921

A boring bar with separate tools for small diameter holes is announced by Robert H. Clark Company. Present-



Handy boring bar

ed as a companion tool to the Clark adjustable tool holder, these boring bars are available in sets of four—3/16 x 5"; ½/ x 6"; ½/ x 7" and ½/ x 8".

Boring bars with separate cutters in sizes below ¾/ have not generally been available, yet these bars are designed for use without bushings or adaptors.

Tungsten carbide manufacturers now supply solid round bits in sizes down to 3/32" for use in the small bars.

MAGNETIC FILTERING IS DONE AUTOMATICALLY

Barnes Drill Company, offers a mag-netic-automatic coolant separator for removal of harmful metal and abrasive particles from honing coolants having a non-soluble base. Outstanding fea-

(Continued on page 176)

BY RUTHMAN In Two Lengths

19 inches and 23 inches below the high level line of coolant reservoir. Model HL-15025-B has been produced to meet the need of machine tool requirements for greater tank capacity and utility of floor space.

Furnished with 1/4 HP motor for continuous duty and 1/2 HP motor for extra heavy duty, in standard current characteristics. Entire rotating assembly on heavy one-piece ground shaft is electronically balanced. Simple installation.

> Types and models available for every requirement.

MODEL HL-15025-B

WRITE FOR CATALOGUE

THE RUTHMAN MACHINERY CO. CINCINNATI 2, OHIO 1815 READING ROAD

The "Gusher"-A Modern Pump for Modern Machine Tools

With National Security Fully Served -

Johansson Gage Blocks

Available Without Priority



Johansson Gage Blocks, heretofore available with AA-1 priority, are now available without priority.

The manufacture of chrome-plated Johansson Gage Blocks, discontinued since July, 1941 in the interests of meeting urgent production requirements for our regular steel Gage Blocks, has

en resumed. In accordance with the arrange-

ments previously in force, worn sets of Johansson Gage Blocks may now be returned to the factory, on now be returned to the factory, on an exchange basis, for new chrome-plated sets. This economical salvage service applies, of course, only to Johansson Gage Blocks, any of which (down to size 0.050°) can be surfaced accurately with chrome plating. Write for new Price Schedule. Dept. TE.

FORD MOTOR COMPANY, JOHANSSON DIVISION, Dearborn, Michigan





THE PROOF

IS IN THE PRODUCTION

- More pieces between grinds
 - More grinds per tool
 - Less down time
 - Lower tool cost

More production! Lower costs! Reports are the same whenever plants use TECO Cemented Carbide. The surest way to learn what TECO Cemented Carbide tools can do for **you**, is to run them under your own conditions.

MAKE THIS SIMPLE CHANGE! Just use TECO Cemented Carbide in place of present carbide tools on any turning, boring or facing job. Then compare results with former production.

TECO Cemented Carbide stays on the job longer because it is harder, denser, more uniform—thus has greater resistance to wear and breakage. Outline your operation for recommendation—or have a tool engineer discuss your needs, without obligation. Catalog and price list on request.

IMMEDIATE DELIVERY FROM STOCK can be made on most standard TECO Cemented Carbide Tools and Blanks.



TUNGSTEN ELECTRIC CORPORATION

570 39th Street, Union City, N. J.

Branch Office: 2906 Euclid Avenue, Cleveland, Ohio

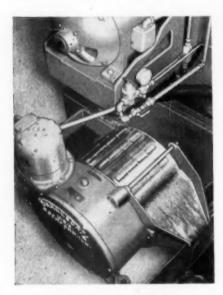
Representatives: Indianapolis, Ind. Chicago, Ill. Detroit, Mich.



ture is automatic action, which reduces maintenance to minimum and permits operator to devote full time to productive work of honing or grinding.

No filters are used in the device that need changing. The device works equally well for continuous or intermittent operation. Swarf and magnetic particles are removed through magnetic attraction.

The separator is self-contained, actuated by a motor. A magnetic rotary



Useful coolant separator

INFORMATION FREE

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drum attracts metal particles as they pass through the coolant.



New clamping vise

10941

PEDAL OPERATION FREES WORKER'S HANDS

A powerful air or hand-operated bench vise has been developed by Bellows Company as their latest addition to the line of controlled air devices. The tool consists of a standard 4" Reed bench vise operated by a powerful 8", foot-controlled air cylinder. Clamping pressures are adjustable from zero to 2½ tons, the practical safety limit of the vise itself.

Labled Vispeed, the device operates through the full range of the 6" jaw opening. Positive safety control limits the air-powered movement of the movable jaws adjustable from zero to a maximum of 1".



Wheel balancing stand

HARDENED RAILS MAKE BALANCING STAND

Indication of balance of surface grinding wheels is possible through use of a stand made by Taft-Peirce Manufacturing Company. The stand consists of a cast iron base on which two

10951

sists of a cast from base on which two hardened rails are mounted. Balancing arbor rolls freely on these rails to indicate balance of the mounted wheel. (Continued on page 178)

PRODUCTO SERVICE

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For quick action, phone one of the following:

Assembly Plants and Warehouses

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PRODUCTO DIE SETS

Quick service on all Special Die Sets and Bolster Plates from Bridgeport and Detroit.

THE PRODUCTO MACHINE CO.

990 Housetonic, Bridgeport 1, Conn.

Write for Catalog No. 9



Do It Better!..on a HYDRATROL LATHE!

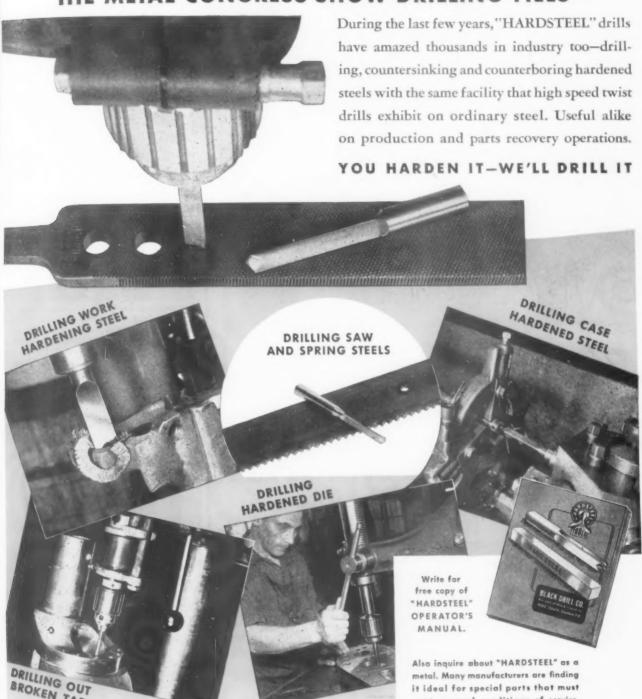


There are many jobs today which undoubtedly could be better done on this machine . . . Investigate!

Tehmann Machine co.

CHOUTEAU AT GRAND * ST. LOUIS 3

THE DRILL THAT AMAZED THOUSANDS AT THE METAL CONGRESS SHOW DRILLING FILES

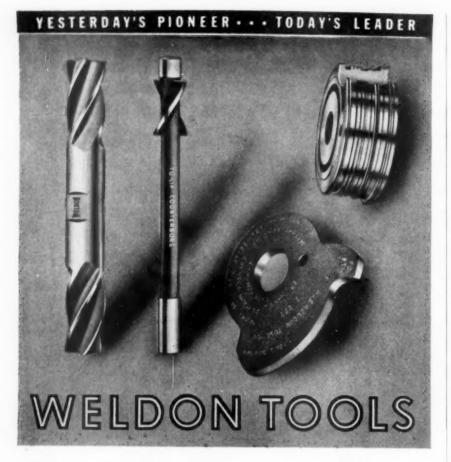


metal. Many manufacturers are finding it ideal for special parts that must meet unusual conditions of service.

DRILLS . TOOL BITS . SPECIALS

BLACK DRILL CO. . Division of Black Industries . 1400 E. 222nd St., Cleveland 17, Ohio

BROKEN TAP



They take it in their Stride

Where production requirements call for a combination of high speed and fast feed with heavy strain WELDON Tools take it in their stride.

The secret is in their special design, high quality material, fine workmanship and rigid inspection.

Let us help you on your cutting tool problems.



WRITE FOR CATALOG 8-B





-NEW EQUIPMENT

FIRM RELEASES NEW HIGH SENSITIVITY GAGE

(Q96)

Spring and bellows actuated pressure gages for ranges between zero and five inches, and zero and 50 inches of water, are available to industry through Brown Instrument Company, Minneapolis-Honeywell Regulator Company Division.

Two new types are being introduced, one gage has a single spring for pressure ranges. The second type has two springs in tandem for vacuum and compound ranges.

Applications for the gages include combustion pressures, processing, testing steel, petroleum, chemical and aviation engine manufacturing.

INFORMATION FREE

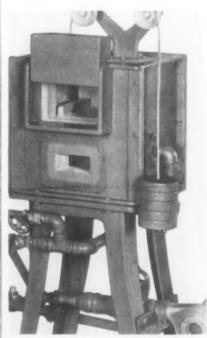
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HEAT TREAT FURNACE (Q) OFFERS THREE HEAT ZONES

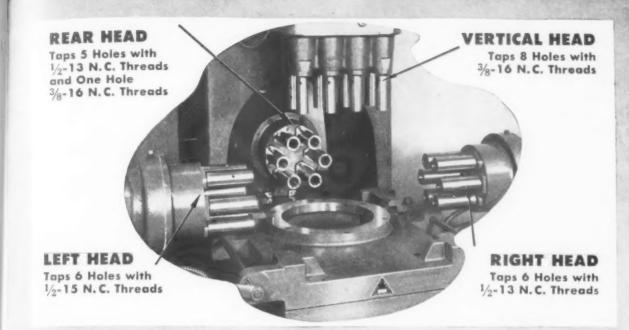
Barkling Fuel Engineering Company offers a multi-purpose heat treating furnace which has three heating areas in one installation. An indirect heating area is provided for hardening, annealing, stress relieving and carburizing. A direct heat chamber provides for heating for tool dressing, forging and bending. A third surface can be used for tempering tools and dies. Constant heats, without customary

Constant heats, without customary fluctuations, are maintained by an air relief valve operating with a blower. Overall dimensions of the pedestal furnace are 25" wide, 19" deep and 53"

Door opening to the indirect heating chamber is $4\frac{1}{2} \times 8^{n}$ and opposed openings to the direct heating chamber are $2 \times 4\frac{1}{2}^{n}$.



Furnace has many uses (Concluded on page 180)



27 HOLES TAPPED EVERY MINUTE FROM 4 DIRECTIONS IN A TRUCK AXLE MOUNTING

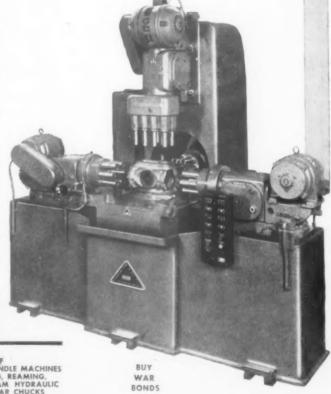
Four LeMaire Standard Lead Screw Tapping Units—three horizontal and one vertical—are employed in this new special multiple tapping machine, designed and built by LeMaire, to tap 27 holes in a truck axle mounting or carrier.

The main base supports two No. 1 Tapping Units, one at each end. A third is located at right angles on the same horizontal plane, while the fourth unit, mounted on a "straddle column", is used to approach the work vertically from above.

The production of this machine is given at approximately 44 pieces an hour.

(The drilling of the holes was done on a special Multiple-Drilling Machine, also designed and built by LeMaire. It was described last month.)

This is just another example of how our engineering staff meets problems dealing with demands for greater production. If you are interested in increased production capacities of machines, let us help you work out your problems—whether they deal with your immediate needs or those in the future.



PRODUCTS LEMINER BUILDERS

LEMAIRE TOOL & MFG. CO. 2657 S. TELEGRAPH ROAD SINGLE AND MULTIPLE SPINDLE MACHINES
FOR BORING, DRILLING, REAMING,
TAPPING, ETC.—TWIN RAM HYDRAULIC
UNITS—MATCH-IT GEAR CHUCKS
DEARBORN, MICHIGAN

JANUARY, 1945.

Q961

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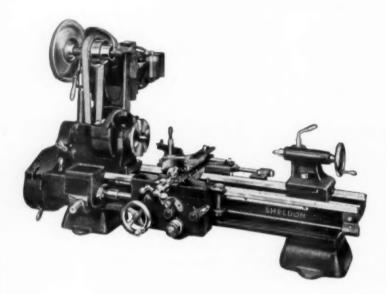
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SHELDON LATHES



Among moderate priced lathes, the SHEL-DON 1026 BMWQ is not only superior in design, workmanship, features and precision, but in its convenient, space-saving and more efficient overhead motor drive

Write for Catalog



SHELDON MACHINE CO., INC., 4252 N. KNOX AVE., CHICAGO AI, U.S. A.

-NEW EQUIPMENT

TAPPING MACHINE AVAILABLE TO TRADE

Q92

Cleveland Tapping Machine Company has developed a tapping and threading machine for a leading manufacturer of aircraft parts. The machine is lead screw controlled at all times, yet has rapid approach and retraction of the spindle. The lead screw assembly is never disengaged from the spindle. Capacity is reported to be 2000 tapped holes per hour.

Rapid approach and retraction is controlled by two air cylinders which exert no pressure on the spindle when tapping. The rapid approach can be



Employs new principle

set to stop within .010" of the hole to be tapped. Rapid retraction becomes operative as soon as the tap leaves the hole. The tap is removed at twice normal tapping speed.

Infinite speed is possible within the range from 40 to 400 RPM, but higher ranges can be supplied. This is because of a special, quick adjusting variable drive which constantly revolves in the same direction. The machine handles holes from 16" to 3" in steel and will tap a Class 3 fit on a production basis.

THE END

INFORMATION FREE

To receive the booklets listed in this section, list the key number found on the heading of the desired literature and your name and address on the postcard coupons—page 163.

The war years have proven to

American Industry that the light

machine tool has an important place in Production. Walker-Turner machine tools have demonstrated their ruggedness under most exacting conditions. Don't let pre-war operating methods affect your post-war competitive position. The versatility of Walker-Turner machine tools will ensure production equal to—and, in many cases, better than—

heavier and more expensive

WALKER-TURNER COMPANY, Inc.

New Jersey

equipment.

Plainfield

18

nd

all

100 is

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be

DON'T LET PRE-WAR METHODS KILL POST-WAR PROSPERITY!

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HERE'S HOW WALKER-TURNER MACHINE-TOOLS CUT COSTS!



260-5200 R.P.M.

60-5300 S.F.M.

160-8300 R.P.M.

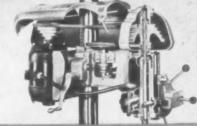
Wide range of operating speeds enables you to select the optimum cutting speed for any material.





Walker-Turner flexibility saves time and cuts costs in special tooling set-ups.

Set up horizontally, this Walker-Turner 15 Drill Press flares the ends of tubing. This Walker-Turner 20" Drill Press drills five holes and reams two holes in one operation.



Low power consumption reduces operating costs.

This motor on a Walker-Turner 20" Drill Press provides speeds for drilling up to 34" in steel, !" in cast iron.



Low price decreases capital investment.

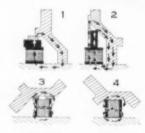
This Walker-Turner 4-spindle 20" Drill Press costs no more than a single heavy unit, yet has several times its production capacity.



MACHINE TOOLS

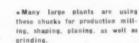
DRILL PRESSES — HAND AND POWER FEED . RADIAL DRILLS
METAL-CUTTING BAND SAWS . POLISHING LATHES . FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL . MOTORS . BELT & DISC SURFACERS

THE "IMPOSSIBLE" DOES NOT TAKE LONGER



We think that you will agree that the holding at the left is "impossible" on conventional Magnetic Chucks. • We agree that you may not have "that kind of work". No doubt you do have many pieces that are not easily set up on your present chucks.

. These NEW chucks will save looking for or using Magnetic blocks, vises, straps, bolts, etc.



The arrows indicate the path of the magnetic flux in the NEW POWER GRIP CHUCKS. Uneven or odd shaped pieces are held as shown with plain steel blocks (the black blocks are solid).

These chucks have often returned their cost, by holding work without expensive jigs or fixtures, on one job.

Furnished complete, ready to plug into 110-volt A. C. light circuit,—nothing more to buy. Complete unit easily portable. GUARANTEED. Write for information or send print for details.

ROCKFORD MAGNETIC PRODUCTS CO.

1304 Eighteenth Ave. — Rockford, III.

HARTFORD SUPER-SPACER FOR GRINDING JOBS



- · As shown here in an operation on an aircraft clutch, the Super-Spacer grinds the clutching surfaces to a close radial tolerance (after the teeth have been roughed and hardened). Note that no guards against the dry-ground dust are necessary, because the Super-Spacer, as engineered by Hartford, is protectively sealed.
- · There are endless possibilities for other applications of this accurate, time-saving indexing unit as a basis for special fixtures. Its adaptability is widely increased when equipped with a face-plate and draw-in collet.

WRITE FOR LITERATURE

THE HARTFORD SPECIAL MACHINERY CO.

RIGID ALIGNMENT STRICTLY ACCURATE

EASILY ATTACHES TO QUILL OF PRESS

QUICK INDEXING

FINGER-TIP CONTROL CHANGES DRILL POSITIONS



DRILL PRESSES IN

Multiply drill press production 4 times with the new QUADRILL. Attaches directly to the quill of most drill presses. Three drills remain stationary for safety while only drill in work position operates. Actually converts a single drill press into four. Does away with moving work from press to press and reduces frequent changes of tools. Saves floor space, All this and more. Write for complete details and prices today.

CHICAGO CORPORATION 919 N. MICHIGAN AVENUE, CHICAGO 11, ILLINOIS





Where a "Quick Change" is needed.

in production welding, which means working on top, bottom and on all sides of the weldment, a "Quick Change" of position is necessary for greater time saving, greater efficiency, greater safety to men and materials, and with resulting LOWER COSTS. A C-F positioner will do all this at the press of a button, without crane help or handling crows—if will rotate a full 350° at variable speeds from 0 R.P.M. up, tilt to 135° beyond horizontal, and permits welding, down-hand, all sides, surfaces and angles in the one set-up with larger rods and fewer passes. All C-F positioners are pedestal mounted for maximum floor and work space—all are adjustable for height.

Write for Bulletin WP-22 CULLEN-FRIESTEDT CO.

1318 S. Kilbourn Ave.

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THAT HELP Now!

Production Handbook

Puts you up-to-the-minute on modern manufacturing

on modern manufacturing
1676 pages. Covers plant organization, production planning and control, materials
handling, time and motion
study, plant layout, job evaluation, etc. Packed with new
developments and latest applications in outstanding concerns. Board of 90 editors.
For everyone in manufacturing. Case examples; hundreds of working forms.
Flexible binding. 37,50



PERSONNEL RELATIONS

By J. E. Walters, Principal, McKinsey & Company. Application in a democracy of labor relations and techniques of personnel administration, presenting viewpoints of labor, management and government as each must recognize them in dealing with the others. Valuable working information. \$4.50

The Industrial Supervisor

By John M. Amiss, Director Industrial Education, Chrysler Corporation; and Traver C. Sutton. Up-to-the-minute training guide to improvement of skill and leadership, for all training departments, and for smaller concerns. Based on experience with thousands of supervisors. \$3.00

SIMPLIFIED TIME STUDY

H. I. Myers, Controller, Farnsworth Television & Radio Corp. For every occasion where a supervisor, foreman, shop steward, or cost man can take advantage of time study for his purposes. Clear and simple—anyone can follow the instructions and get results.

Collective Wage Determination

Z. C. Dickinson. Problems and principles in bar-gaining, arbitration, law. Covers adjustments; wages and industrial fluctuations; wage policies and practices in private collective bargaining.

WAGE INCENTIVE METHODS

By C. W. Lytle. A practical book keyed to the country's greatest production effort. 25 basic plans, with their variations. Tables and charts illustrate performance. Helps you decide the plan for your business. 100 leading companies supplied the data.

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Cost Accountants' Handbook

Theodore Lang, Editor. For every man who works with costs—an unequalled fund of information on whole range of cost accounting, organized for ready application. 74 contributing editors represent cost experience in all kinds of manufacture. \$7.50

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THE RESERVE	Production Handbook	\$7.50 4.50 3.00 2.50 5.00 6.00 7.50
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No more need for angle plates! The Zagar V-H Fixture has two right-angled faces milled with key slots in two directions on each face, adapted to any position on a drill press or milling machine. Ideal for drilling and tapping cross holes in round stock. Meehanite body virtually indestructible; finest workmanship throughout . . . All basic advantages of Zagar fix-tures retained. Simple design; fool-proof; rugged; no chip trouble; great variety of uses without special tooling.

Get new Zagar Catalog "E"

ZAGAR TOOL, INC., 23881 Lakeland Blvd., Cleveland 17, Ohio





with the DUST MENACE Get TORIT PORTABLE DUST COLLECTORS

TORIT Dust Collectors draw dust laden air from hoods surrounding grinding, cutting and polishing wheels down through a compartment in the cabinet then up through a set of filter bags. The dust is, therefore, trapped on the outside of the bags so it is easy to keep them clean.

TORIT Dust Collectors are installed by piping directly to the abrasive wheels.

Being completely self-contained, TORIT can easily be moved about to meet new production set-



Write for the TORIT Dust Collector cata-log giving full information and description of different size units.

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TORIT Dust Collectors



For High Production

HY-PRO precision taps produce consistently more threaded pieces to lower your tapping costs. Their extra hardness and durability result in longer life, greater accuracy, more wear between sharpenings.

Send for catalog on com-Send pany letterhead in your

Our Engineering Staff will give them careful study and recommend the best solution.

Tapping Problems.



New Bedford, Mass. U.S.A. BUY MORE BON

1650 1 SEN 200 1 In War, as in Peace

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applica-

CERROBEND (Melting Temp. 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

CERROSAFE (Melting Temp. 190° F.) Used to accurately proof-cast cavities such as molds, gun chambers, forging dies, etc. and for many similar applications.

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MONTREAL, CAN., Deminien Merchanto, Ltd.
NEW ORLEANS, LA., Metal Goods Corporation.
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CERRO DE PASCO COPPER CORPORATION

40 WALL STREET

NEW YORK 5, N. Y.



These double nut fittings can be used on tubing having a wide range of wall thicknesses. They eliminate expensive stocking of various weight fittings.

PROVIDE LEAK-PROOF, VIBRATION-PROOF CONNECTIONS

Permanent and tight connections are assured under the most severe operating conditions because the compression nut compresses the slotted collet nut to the tube, providing a grip that cannot loosen under vibration or shock.

3 LOAD PLACED ON TUBE

The collet grip design places the heavy load on the tube and fittings instead of on the angle of the flare.

4 SECURELY GRIP AND SUPPORT FLARE

The long bearing surface of the collet nut securely supports the flare, and grips the tubing safely beyond the flare. Vibration is not placed on the flare. A firm grip is provided without digging or cutting.

EASY TO ASSEMBLE

Easy installation by merely loosening compression nut which then permits collet nut to slide freely on the tube. This fitting permits connections of short lengths of tubing in close quarters without bending or damage to tubing.

REQUIRE NO THREAD-ING, WELDING OR SOLDERING

PROVIDE FITTINGS STRONGER THAN THE TUBING ITSELF

FITTINGS CAN BE RE-USED These collet grip fittings can be used repeatedly without distortion of threads or the collet grip feature.

FITTINGS TO MEET ANY OF YOUR REQUIREMENTS

Collet grip tube fittings are available in a wide variety of standard types and sizes for all industrial and hydraulic applications of tubing where permanent, safe connections are required. Standard types are stocked for tube sizes ranging from \(\frac{1}{4}'' \) to \(1'' \).

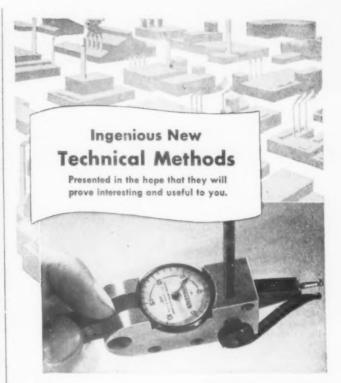
Pree Additional Data... This new Bulletin No. 44 contains complete details, specifications and maximum internal working pressures for each type of fitting. Write today for your free copy.



CALLET GRIP

LOGANSPORT MACHINE CO., INC

902 PAYSON RD. . LOGANSPORT, INDIANA



New Internal Gage Avoids Over Cutting ... Saves Wasted Man Hours

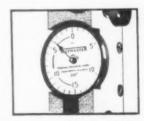
At last a gage that takes the guess work out of checking internal diameters either machine bored, or close ground and lapped. It is called the Keene Internal Gage and is the first accurate method for fast correct checking of internal splines and gears on both minimum and root diameters. The gage is ideal for machining and inspection work, and proves its value in increased production. It can be used with either a master, or micrometers.

This time saving development is constructed of aluminum, is six inches long and weighs only five ounces. Available in models designed to read in thousandths (.001) or in tenths (.0001).

When your gage has been checked the thousandths left to bore, the actual job of machining may become tedious. It is then when Wrigley's Spearmint Gum helps keep you alert and watchful. Chewing gum seems to assist you over the dull spots in the day's work. And Wrigley's Spearmint will aid you in your peacetime job by helping to keep you wide awake and efficient during that part of your work that may seem unimportant, but which actually means perfection to the completed product.



Determining correct setting for agge.



Closeup of dial showing simplicity and fast visibility.

You can get complete information from Keene Electrical Machinery Co., 542 W. Washington Blvd., Chicago 6, Illinois

NEW LITERATURE

OF INTEREST TO PRODUCTION EXECUTIVES

(1207) Plastic Designing

Design data on plastics for product designers is contained in a General Electric publication currently being circulated. The booklet contains information on thermosetting and thermoplastic materials, showing physical properties of many types and in-cludes suitable data for designers who are interested in including plastic materials in their products. An extremely concise editorial job.

(1208) Milling Tools

A new illustrated 50-page milling machine tool and accessory catalog has just been issued by Kearney and Trecker Products Corporation. The book gives complete listings and information on arbors, cutters, vises, high speed attachments and center scope for every standard milling machine. Arranged for easy location of information.

(1209) Thread Miller

A modern high speed precision machine tool for external and internal thread cutting is described in a new 16-page publication of Universal Engineering Corporation. The bulletin includes engineering drawings, cutaway views and view of various types of op-

INFORMATION FREE

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eration, tables of measurements and shows typical threaded parts made on the new automatic machine. Eleven advantages are claimed for the new ma-

(1210) Hydraulic Actuation

Illustrating and describing the John S. Barnes Corporation's line of hy-draulic units, a new bulletin has been made available. The folder lists advantages claimed for hydraulic actuation of machine units and depicts typi-cal units ready for incorporation into machine designs.

(1211) Expansion Broach

East Shore Machine Products Com-pany has available a bulletin on the Glenny expansion keyway push broach, which they say is adaptable for keyway cutting, replacing slower and more expensive machine set-ups. Tolerances of .0005" can be maintained on all work. The tool can be used on arbor presses for occasional work.

(1212) Multiple Spindle

Thriftmaster Products, Zimmer-Thomson Corporation division, is mailing a 16-page brochure describing its design of improved multiple spindle drillheads. The bulletin shows cut-away views of both drillheads and accessory equipment. A new spindle of special design permits close and simple depth adjustments to .0015 increments. The catalog also contains a graphic description of multiple machining and drilling operations to reduce costs.

(1213) Steel Shaping

Jessop Steel Company offers a new piece of trade literature in their new booklet showing typical cast-to-shape tool steels. Graphic illustrations show samples of the work available to users of punches, dies, tools, press tools, etc. Special instructions for handling the steels is included.

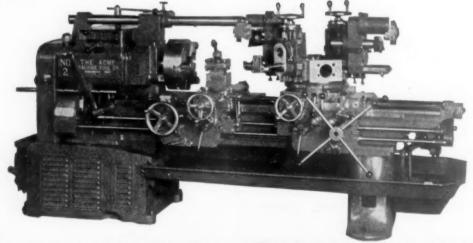
(1214) Thread Dimensions

A table of machine screw thread dimensions is being offered by Manufac-turers Screw Products. The table shows nominal diameter and threads per inch NF and National Coarse for all standard screws. Other data are in-

(Continued on page 188)

CINCINNATI A C M E TURRET LATHES

SPEED PRODUCTION-SAVE TIME

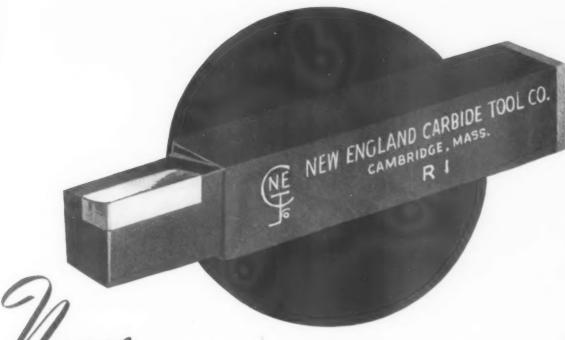


GREATER RIGIDITY AND ACCURACY UNDER HEAVIER CUTS AT FASTER SPEEDS!

The above illustrated No. 2 ACME Universal Turret Lathe with its stationary overhead pilot bar and headstock brackets together with rigid turret tooling permits heavy multiple cuts. These features assure accuracy while faster speeds are possible through the use of cemented carbide cutting tools. This machine features heavy duty multiple turning heads and vertical side tools and heavy duty reversible cutter holders. Also shown is the lead screw type chasing attachment with split nut brackets and threading dials on both carriages.

• WRITE FOR COMPLETE DETAILS.

THE ACME MACHINE TOOL CO. 4955 SPRING GROVE AVE., CINCINNATI 32, OHIO



lever a finer line of carbide tools anywhere

That's a strong statement, but here are the facts — everywhere our salesmen go, we get this general comment — "We've seen your ads and folders and New England tools look swell, but we figured the retouched photos were an exaggeration. When we see the actual tools, however, we find that that mirror finish is really the truth, and the black shanks and color identification really look better than any photo could show."

It is the truth, and we, or our representatives, will be pleased to send you a tool (right off the shelf) to prove this point.

All standard New England lathe tools are now attractively packaged and stocked for immediate delivery.

You get all these features, which result in greater output and finer work finish, at a price that is as low as ordinary carbide tipped tools.

Write for folder which gives complete details and prices.





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NEW ENGLAND CARBIDE TOOL CO., Inc.

60 BROOKLINE ST., CAMBRIDGE 39, MASSACHUSETTS

(1215) Gaging Blocks

Johansson Division, Ford Motor Company, is distributing a folder describing Set No. 2 of the Johansson Gage Blocks. The set consists of 35 blocks to make 80,000 different size gages in steps of .0001", from .300" to more than eight inches. Typical applications of the blocks are illustrated. plications of the blocks are illustrated.

(1216) Drilling Steels

An operator's manual is being distributed by Black Drill Company, Division of Black Industries, for use in obtaining recommended drill speeds for hardened steels, instructions for dry and wet drilling and complete new information on the application of Hardsteel, a company product, in tool bits and tool tips. The booklet contains 26 pages in sturdy binding.

(1217) Precision Equipment

Graphic illustration of their precision equipment is contained in a cir-cular edited by Lombard Governor Corporation. The bulletin covers their devices for use in inspection, layout, toolroom, production, assembly and general shop use.

(1218) Welding Symbols

A new and informative wall chart has been prepared by Hobart Brothers for distribution to users of welding equipment. The chart follows recom-mendations of the American Welding Society and is clearly printed. The graphical language is illustrated for fusion welding, resistance welding and

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for those requiring both fusion and resistance.

(1219) Service Record

An institutional booklet shows in 100 pages the "service record" of Republic Steel Corporation. Contained is the story of 42 Defense Plant Corporation projects with a total wartime cost of more than \$200,000,000.

(1220) Production Tools

Zagar Tool, Inc., is circulating a looseleaf catalog of its products. Each item is described in text, illustrated with a photograph and finished off with an engineering drawing. The firm plans to issue supplementary pages from time to time to keep the catalog up-to-date and complete.

(1221) Materials Handling

Dedicated to reduction of waste in factory handling of materials, a new publication of Factory Service Com-pany details the "Turner System" for material handling. The edition contains 22 pages devoted to various components of the system from tote boxes to the mass handling of automobile tops. The information is grouped under ten principal headings. A step to orderly movement and storage of material.

(1222) Heat Treating

Devoted to promotion of its line of Duty Electric Company has published a 42-page catalog showing typical samples. The booklet is brightly illustrated and contains at the end a complete list of company publications on a variety of electric devices.

(1223) Silver Anniversory
Marking 25 years in the manufacture
of jigs and fixtures, Federal Engineer. ing Company has printed a brochure devoted to expansion of the company to its present position. Folded inside the back cover is a list of equipment operated by the firm. Handsomely illustrated and printed.

(1224) Coolant Separator

Barnes Drill Company has printed a folder devoted to their magneticautomatic coolant separators for use with honing and grinding machines. The folder details engineering specifi-

(1225) Resistance Welding

A new catalog on resistance welding electrodes and alloys has been com-piled by P. R. Mallory & Company, Inc. The booklet lists the firm's complete line of standard spot welding electrodes and watercooled holders. A list of "do's and don'ts" for improved welding is included. Stock sizes of alloys, their applications and physical properties is among data offered.

(Continued on page 190)



Bulletin 108-16

2853 Twelfth Ave. So.

DAYTON ROGERS MFG. CO. MINNEAPOLIS 7



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(1226) Cold Sawing

Motch and Merryweather Machinery Company is currently distributing their new publication on the cold saw-ing of metals. The booklet contains 62 pages of information about MMM equipment, giving data on speeds, uses,

(1227) Wolding Controls

page booklet on controls for seam well-mg. The edition discusses advantages of resistance walding and cities topical installations where elections control-ptionale necessary haskup to make the process applicable in metal (alrecation Fully illustrated and complete site

(1228) Torque Toots

Ingineering data, including tables formulae and a graph, are aide to de termining relative shearing torques for holes, acrews and stude—all contained in a 12 page publication of Apro Mossberg company. Compiled for plant engineers it is also meful for users of torque tools. Also included is a first of algorithms.

(1229) Crucible Melters

(1210) Marizontal Machines

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(1231) Wolders Shields

112321 Hydraulic Presses

coloural Breach Company, describes its new ime of inplrantle straightening arrives, designed are finithed and number work to a bulletin. Rame are presented by direct acting bydramlic chitothers and are anympped for hand or not solved.

12231 Fabricated Parts

(1234) Burr Removal

A report on Removing Burn with lower Brushes" contains extensive h intion on latest pechniques pro-lates and equipment it has been rathing wheels The 15-page file tracklet with 25 illustrations conapplications as been prepared to interested to the most effect of this production tool for land the first or automatic peration.

the of summer short lists the most their general amplication

11235) Electric Tool

More Power To You" is a report of an electric hard tool that turns over the RPM, delivers a toll 1/6 HP at the twintle and weights only 35 ounces. The bulletin describes the patented inches of this tool which is mane-actured by Precise Products Common It is shown as applied to a cause of work including breaking corners.

Concluded on page 192)





engineers ste,, irained for special tosks have greatly speeded us towards victory.

And SPECIAL CUSTING TOOLS-fellered for particular jobs have hastened our gigantic production program,

N PEACE-expecially trained technic suickly help to bring us much needed precotime products-but-

Again they must have special tools-spec utting toxis—carbide-tipped or (righ-speed that -for the quick tooling we are all hoping for,

A.C.E. is ready to bring its valuable war-our experience to your cutting-look problems. YOU can PLAN your looking now.

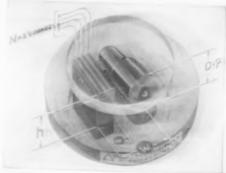
If your engineering department is overloaded we will be gled to offer the services of our regimeering department to get your treiling problems in order.

AMERICAN CUTTER & ENGINEERING CORP. 31751 Mound Road

SPECIAL CUTTING TOOLS HI-SPEED OR CARBIDE-TIPPED

MEASURING A PLUG GAGE with LIGHT WAVES

using an optical flat, a toolmakers flat and a gage block



The formula is:

b - 1,000012 - N

7./1611

Substitute the actual values D = .750 + 1.000012 > 3/2 =

and get the answer 0 = .750168 inch.

It's just that simple!

Write for anw, free Lightwave Measurement Socklet.



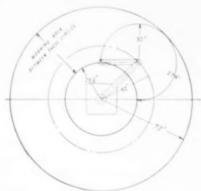
AGME INDUSTRIAL

Makers of Standardized Jig and Fixture Eas 208 N. Loflin St. MQNroe 4127 Chicago 7, III.



TIME studies show that with a CP Radial Drill an operator can drill Dural sheets stacked to 5%" thickness in an overall time of two seconds — including locating and drilling.

Developed primarily for stack drilling, CP Hicycle Radial Drill is equally proficient for other types of bench drilling. Available with either 60" or 72" reach. Two types of mountings: No. 10 Arm, equipped with hole spotter, for continuous production drilling up to 5/16" at 10,800 r.p.m. — a speed made practical by compressed air-fed oil to keep the drill bit cool and sharp; No. 11 Arm, for drilling up to 34".



Operating Range of Nos. 10 and 11 Jack-Knife Arms

PNEUMATIC TOOLS
ELECTRIC TOOLS
HYDRAULIC TOOLS
ROCK DRILLS

CHICAGO PNEUMATIC
TOOL GO COMPANY

General Offices: 8 East 44th Street, New York 17, N.Y.

AIR COMPRESSORS
VACUUM PUMPS
DIESEL ENGINES
AVIATION ACCESSORIES

(1226) Cold Sawing

Motch and Merryweather Machinery Company is currently distributing their new publication on the cold saw-ing of metals. The booklet contains 62 pages of information about MMM equipment, giving data on speeds, uses,

(1227) Welding Controls

General Electric is circulating a 14page booklet on controls for seam welding. The edition discusses advantages of resistance welding and cites typical installations where electronic-controls provide necessary backup to make the process applicable in metal fabrication. Fully illustrated and complete with tables of engineering data.

(1228) Torque Tools

Engineering data, including tables, formulae and a graph, are aids to determining relative shearing torques for bolts, screws and studs-all contained in a 12-page publication of Apco Moss-berg Company. Compiled for plant engineers, it is also useful for users of torque tools. Also included is a list of elementary definitions.

(1229) Crucible Melters

A new literature offering of Crucible Manufacturers Association is their melter's handbook, a treatise on crucible furnaces and storing, handling and use of crucibles. The pamphlet is illustrated with actual scenes of installations and applications.

(1230) Horizontal Machines

Illustrating their machine tool line of

INFORMATION FREE

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horizontal boring, drilling and milling machines, Ohio Machine Tool Com-pany is currently offering a new cata-log. The 24-page booklet includes engineering data describing many of the company's products.

(1231) Welders Shields

A catalog describing a new line of welders face shields known as the "Hundred Series" has been issued by the Boyer-Campbell Company. The distributor states that the primary design feature of the new line is comfort, and that they are available in several sizes and thicknesses of windows.

(1232) Hydraulic Presses

Colonial Broach Company, describes its new line of hydraulic straightening presses, designed for finished and rough work in a bulletin. Rams are operated by direct-acting hydraulic cylinders and are equipped for hand or foot control. Capacities range from 10 tons to 50 tons.

(1233) Fabricated Parts

A very attractive brochure describing the diverse operations employed in fabricating tubular parts of seamless copper, brass and aluminum has just

been released by the Wolverine Tube Division of Calumet and Hecla Consolidated Copper Company. It is pro-fusely illustrated and carries many charts and tables which should prove useful to anyone working with copper tubing. Copies are available to persons requesting them.

(1234) Burr Removal

A report on "Removing Burrs with Power Brushes" contains extensive information on latest techniques, procedures and equipment. It has been prepared by the Osborn Manufacturing Company, manufacturer of power brushing wheels. The 15-page, file-size booklet, with 23 illustrations, covers brushing methods and typical ap-plications. A description of different types of industrial brushes and their best applications has been prepared for those interested in the most effective use of this production tool for fast off-hand or automatic operation,

A brief summary chart lists the most commonly used brushes as well as their general application.

(1235) Electric Tool

"More Power To You" is a report on an electric hand tool that turns over 35,000 RPM, delivers a full 1/6 HP at the spindle, and weighs only 35 ounces. The bulletin describes the patented features of this tool which is manufactured by Precise Products Company. It is shown as applied to a range of work, including breaking corners

(Concluded on page 192)





-engineers etc., trained for special tasks have greatly speeded us towards victory.

And SPECIAL CUTTING TOOLS-tailored for particular jobs have hastened our gigantic production program.

IN PEACE-especially trained technicions will quickly help to bring us much needed peacene products-but-

Again they must have special tools—special cutting tools—carbide-tipped or high-speed steel —for the quick tooling we are all hoping for.

A.C.E. is ready to bring its valuable war-earned experience to your cutting-tool problems. YOU can PLAN your teeling new.

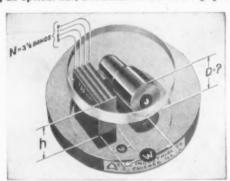
If your engineering department is averloaded we will be glad to offer the services of our engineering department to get your tooling problems in order.

AMERICAN CUTTER & ENGINEERING CORP. Warren, Mich.

SPECIAL CUTTING TOOLS HI-SPEED OR CARBIDE-TIPPED

MEASURING A PLUG GAGE with LIGHT WAVES

using an optical flat, a toolmakers flat and a gage block



The formula is:

 $D = h + (.000012 \times N \times$ Substitute the actual values D = .750 + (.000012 imes 3 $orall_2$ imesand get the answer D = .750168 inch.

It's just that simple!

Write for new, free Lightwave Measurement Booklet.



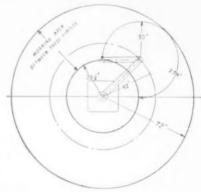
ACME INDUSTRIAL

Makers of Standardized Jig and Fixture Bushings 208 N. Laflin St. MONroe 4122 Chicago 7, III.



TIME studies show that with a CP Radial Drill an operator can drill Dural sheets stacked to %" thickness in an overall time of two seconds — including locating and drilling.

Developed primarily for stack drilling, CP Hicycle Radial Drill is equally proficient for other types of bench drilling. Available with either 60" or 72" reach. Two types of mountings: No. 10 Arm, equipped with hole spotter, for continuous production drilling up to 5/16" at 10,800 r.p.m. — a speed made practical by compressed air-fed oil to keep the drill bit cool and sharp; No. 11 Arm, for drilling up to 3/4".



Operating Range of Nos. 10 and 11 Jack-Knife Arms

PNEUMATIC TOOLS
ELECTRIC TOOLS
HYDRAULIC TOOLS
ROCK DRILLS

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TOOL GO COMPANY

General Offices: 8 East 44th Street, New York 17, N.Y.

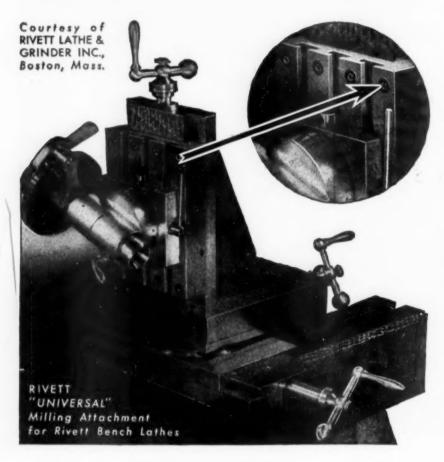
AIR COMPRESSORS

VACUUM PUMPS

DIESEL ENGINES

AVIATION ACCESSORIES





This application on a RIVETT Lathe shows how to get the HOLDING-POWER of hex socket screws in such an essentially flushsurface part as a knee or a slide rest. The V-head of the Allen screw fits the counterbore with complete closed contact all round. This gives frictional grip and a locking rigidity, reinforced by the tightest of set-ups possible only by powerful wrenching with an Allen Hex Key.

The ALLEN Flat Head Cap Screw is "pressur-formd" of Allenoy steel, with uncut metal fibres shaped to the head. Threads also are pressur-formd, with tolerances held to a high Class 3 fit. Strength and precision distinguish these screws in all their applications.

> Procurable from your local ALLEN Distributor; ask him for samples and dimensional data.

THE ALLEN MANUFACTURING COMPANY HARTFORD, * ALLEN * CONNECTICUT, U.S.A.

-NEW LITERATURE

on dies and finishing radii, grinding lathe centers, and fitted to a tool post for internal grinding.

(1236) Cleaning Bearings

A new folder describes the precision ball bearing cleaning machine developed recently by L & R Manufacturing Company. Folders are available on request, along with data pertaining to delivery and price quotation.

(1237) Pneumatic Devices

A 6-page folder has been released by Airop, Incorporated, showing photographic reproductions of applications of air operated devices. Range of installations, principal features and a blue print of construction is furnished along with a range of prices. Suggested applications cover common machining operations, riveting, assembly and clamping.

(1238) Brazing Tips

A new bulletin on the subject of brazing carbide tool tips has been issued by Handy & Harman. This sued by Handy & Harman. This bulletin describes the step-by-step method to be followed in using their silver brazing alloy.

NEW BOOKS

Simplified Time Study by Herbert] Myers. The Ronald Press Company, 140 pages. Price \$2.50.

Written originally for use in small plants where services of a trained time study engineer were unavailable. These instructions to foremen and supervisors have been expanded into a text suitable for self-study and application. Beginning with a discussion of the need for time study, the author expands the theme through use of illustrations and hypothetical cases in the simplest possible language. The whole is a fairly complete survey of time study. Not designed for experts, but would make an interesting text for reference in any factory library. Should prove especially useful to executives, industrial re-lations men and supervisors who need not have an expert knowledge of the science of time study.

Aircraft Sheet Metal Blueprint Reading by Harry H. Coxen, Gerald E. Jackson and Gilbert D. Masters. 132 pages. Price \$2.50.

An instructional manual based on the premise that it isn't necessary to draw blueprints to be able to read them. Arranged in a definite easy-to-hard basis, the workbook provides tests to check progress before the next step is presented. Profusely illustrated, par-ticularly with actual drawings and blueprints of the nature likely to be encountered in aircraft sheet metal work, the text is printed on 8½ x 10¾" with many large prints folded within these dimensions to provide practice readings. In addition to actual blueprint instruction, the authors provide useful tabular material, including a glossary of terms, abbreviations in the aircraft industry and a few arithmetic problems.



... EITHER JOB CAN BE DONE BEST WITH

The I-R line of riveting hammers will handle rivets from $\frac{1}{8}$ " to $\frac{1}{4}$ " diameter ... a range sufficient to handle practically all riveting jobs.

The practice of making enough sizes of each tool to handle various operations has long been a standard I-R policy. Thus, when it comes to riveting, chipping, drilling, reaming, nut running, grinding, digging, tamping, etc., you will find a wide selection from which to choose.

The operating features of I-R Air Tools have made them extremely popular with the men and women of industry. When you get an I-R Air Tool, you get—light weight—power regulation—durability—more power per pound of weight—trouble-free service and safety. In addition, each tool is backed by Ingersoll-Rand service, available in all principal cities.

Let one of our men assist you in selecting the proper tool for the job.

Ingersoll-Rand

AIR TOOLS

8-57

COMPRESSORS . TURBO-BLOWERS . ROCK DRILLS . AIR TOOLS . CENTRIFUGAL PUMPS . CONDENSERS . OIL AND GAS ENGINES

HANDY ANDY

THE BRANSON PUBLISHING COMPANY

NEWSPAPER and radio commenta-tors have loosed floods of printers' ink and gales of bombast, because (as they've suddenly discovered) the English are up to their old game of power politics. And—of all things!—playing it both ends from the middle against America and Russia,

Well, there's nothing new or novel about that, nor, as far as the records show, have the English been unique in their bid for power. For centuries, ecclesiarch and emperor, upstart and pretender, have vied for world control especially for control of the Conti-nent. The first, wanting temporal as well as spiritual power, aligned prince against feudal lord and, coincidentally, discouraged the fusion of kindred peoples. You know, keep 'em divided and weak.

Then, too, intense nationalism tended toward segregation. Instead of encouraging unions between the various European states then, and thereby promoting harmony and peaceful rela-tions, the tendency has been to keep the

Continent in a more or less constant state of dissension and turmoil. Thus, Italy remained a patchwork of petty, contending principalities until united under Garibaldi and the Piedmonts about 80 years ago. Almost coinci-dentally, Germany was united under Bismarck.

Opportunists, rising from obscurity to sudden power—as, for example, Napoleon and, latterly, Mussolini and Hitler—have also violated the peace and, until checked, stood to become absolute monarchs. And while it is entirely possible that, by unifying Europe, these individualists might have established internal peace, that is something that must forever be left to conjecture. They never got that far.

All of these forces threatened the security of the English who, numerically weak as compared to the Continental aggregate, proceeded to raise counterforces-"balances of power" with themselves at the controls. Thus, Balkan and Turk would be aligned against Russian, Frank against Teuton and Teuton against Slav. Then, if any state-or union of states-became powerful enough to threaten British supremacy...well, the cales would again be tipped against it

In addition to powerful political and economic blocs, the English also reared trade cartels that created monopolies, tending to put other nations at a disadvantage. As an example, one might conceive that trade blocs including France, Belgium, Holland—all at the moment empires in suspension—and Portugal might cut us off from tin, rubber and other materials unless we paid through the nose. It is also conceivable that we might not like it.

In the juggling, the English oc-casionally missed a trick. While pro-While professedly champions of democracy, for instance, they upheld Franco as that arch fascist quashed Spain's hopes for liberal government. And Spain be-came the proving ground for World War II. They also gave tacit consent War II. They also gave tacit consent to Mussolini's rape of Ethiopia and favored Hitler's nazism over the short

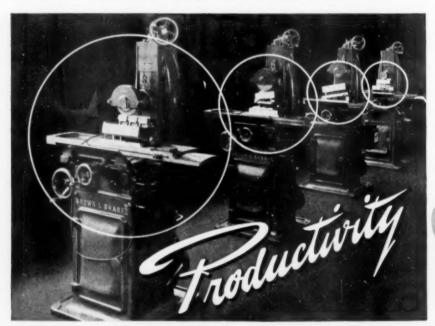
lived German republic.

As it turned out, Hitler got out of hand and, with 11 Duce and the various Quislings, came pretty near upsetting the balance of power "for a thousand years". It took the combined forces of the Big Three, and their allies in exile, to get the Berlin-Rome control. And it's not axis under stopped yet!

In gist, there's the situation. That the English are playing power politics goes without saying. But, they're

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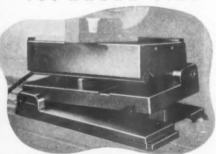
ANGULAR GRINDING



A Magna-Sine should be available for every machine on which an average value of angular grinding is done.

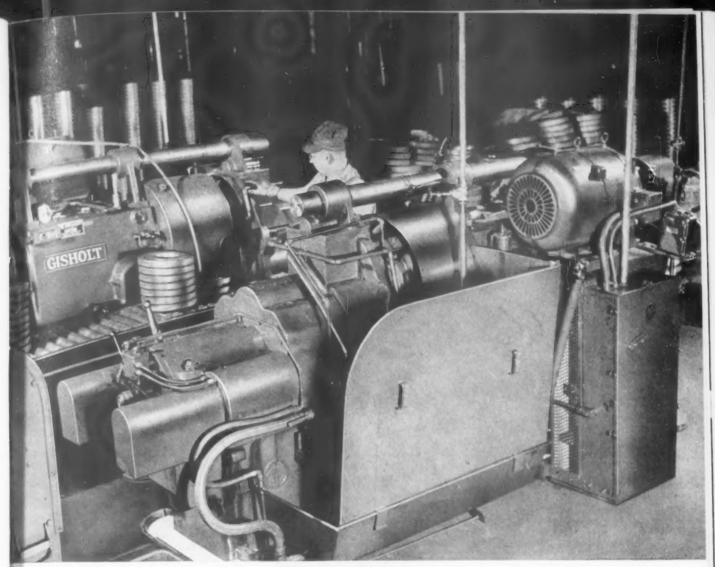
The Magna-Sine saves valuable minutes-or possibly an hour or more - when any individual angular set-up is required. Multiplying this saving of time by the number of jobs on various grinders, you find the means to get many additional PRODUCTIVE HOURS from your equipment. No other chuck or similar device offers the precision accuracy of the Magna-Sine in grinding work requiring either single or compound angles.

WRITE FOR FULL INFORMATION MAGNA-SINE



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WHEELS ON THE FLY.

Wherever you have the volume, consider the advantages of the Gisholt Simplimatic.

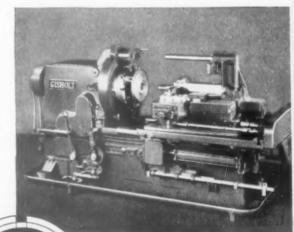
With the ability to out-produce several manually operated machines—to relieve the pressure on skilled hands... to cut costs 50% and more—the Simplimatic may be the practical answer to more than one of your production problems.

Why more than one? Because the Simplimatics provide the extreme flexibility in tool arrangement to handle a wide variety of between-centers and chucking work. Gisholt engineers will gladly explain the Simplimatics to you in complete detail. Or write us for literature.

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Look Ahead . . . Keep Ahead . . . with Gisholt Improvements in Metal Turning





GISHOLT SIMPLIMATICS are built in both platen and radial types. Easy to operate, one man can usually tend two, or even three, machines. No high degree of skill is required.



(Concluded from page 194)

playing it within the law-the law of self preservation. For, it can easily happen that, when the final gun is fired, England's position as a world power may have waned to a point where there won't be any Big Three. Just a Big Two-Russia and America

Russia, naively ignoring power blocs and trade cartels, has grown beyond immediate control and, unless curbed. stands to dominate the Continent And, as the other leg of the Big Tripod, America has not only become the world's industrial and economic giant but by far the ranking naval power. With that competition, and considering the stakes, one can hardly blame the English.

Understand, I am not upholding the British policy. It's just that, knowing what it's all about, I refuse to get excited about it. As a matter of fact, we're playing power politics too, and having been drawn into the international game, we'll have to see it through But, with advantage to ourselves. And since, when this war is over, we shall have largely been instrumental in deciding the issue, it is entirely fair to ask:—What do we get out of it?

No, I am not thinking of material gains, except as these may affect our future security. I am thinking that we shall have earned a say in the peace, in putting over the highly publicised Four Freedoms—the only valid basis for an equitable and enduring peace. Or are we to see these repudiated, even as the Fourteen points were spurned at the farce that was Versailles?

The omens are not auspicious. Even at a time when Allied unity is essential for a speedy conclusion of war, there are being sown the seeds of future dissension. It's all utterly inconsistent. Not only our Allies, but our enemies as they fall one by one, look to Uncle Sam to pull their political chestnuts out of the fire. Yet each, as vociferously, resents any meddling with its internal affairs.

Well then, let us finish this job, butas far as it is practical-with the resolve that, in the future, the Europeans settle their own differences. For us, twice should be enough; we had little thanks for intervening in the first world war and we needn't expect showers of blessing for messing into this

However, we will emerge powerful, so powerful that, for many years, we should be able to discourage threats to our security. We will be strong enough so that, within reasonable limits, we can be tolerant of political blocs and trade cartels. We may even be able to establish free trade-and in that, may find a powerful ally in Rus-We may even be able to convince the English that free trade is preferable to monopoly. And once the economic barriers are down, so that all nations may share in the good life, we shall have eliminated one of the major causes of war. Let our policy be one of Live and Let Live; thereby, we will be one with the forces of Peace.
THE END



Frozen Explosion.

* Photomicrograph of metal chip.

When metal is machined, pressures between the moving body of the piece being machined and the tool edge develop elastic and/or plastic forces within the workpiece. The release of these forces literally explodes successive portions of metal, sending them streaming forth in the form which we call a chip.

Metal-cutting is a matter of metal behavior and flow, in which complex process the cutting fluid regulates temperature, lubricates rubbing surfaces, prevents welding, and possibly dampens vibrations.

Stuart men are skilled in attaining the most favorable balance of these qualities in cutting fluids, both in the lab and on your machines. For further information on the mechanics of metal-cutting, write for your free copy of Stuart's 60-page booklet, "Cutting Fluids for Better Machining."



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CAMS

FOR B&S AUTOMATIC SCREW MACHINES

For 24 years we have been designing and cutting cams and making improved tools for B & S Automatic Screw Machines.

In our shop we have special machinery of our own design for performing the necessary operations accurately. As accuracy in your cams is essential to correct operation we suggest that you investigate our service.

The following important features are embodied in cams cut by us:

- 1. The rises are generated—not step milled.
- 2. The size mill that is used conforms with the size of the roller on the screw machine in which the cam is to operate.
- 3. The height of the lobes are correct, particularly the pullouts for driling and the backouts for cross slides.

A FLAT PRICE FOR CUTTING CAMS REGARDLESS OF HOW COMPLICATED THE SET-UP MAY BE

FOLLOWING PRICES ARE FOR A SET OF THREE CAMS AND INCLUDE BLANKS, CUTTING, HEAT TREATING AND LAYOUT READY TO RUN IN YOUR MACHINE.

#00—\$10.20 complete

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Engineers and manufacturers for the screw machine industry

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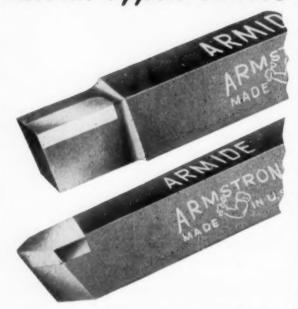
CHICAGO 14

ILLINOIS

JANUARY, 1945

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ARMSTRONG ARMIDE Carbide Tipped Cutters



ARMIDE is a sintered-carbide cutting material which approaches the diamond in hardness. ARMIDE will machine the hardest and toughest steels and sand-filled castings with ease, as well as such heretofore "unmachineable" substances as hard rubber, plastics, and even glass. Because of the extreme hardness of ARMIDE, cutter bits tipped with this material will hold their cutting edge much longer than the finest tool steels and will machine from 10 to 100 times as many pieces between grindings.

ARMIDE-tipped CUTTERS offer special advantages on machining operations involving: (1) Long runs, (2) Sand filled castings, (3) Tough alloy steels, (4) Machining of hardened parts without annealing and subsequent re-hardening, as in maintenance work, (5) High Speed Machining, (6) Machining of unusual materials.

ARMIDE Carbide Tipped Cutters are designed for use in ARMSTRONG Carbide TOOL HOLDERS. They come in two gradex ARMIDE (Red) for machining steel, and ARMIDE (Grey) for machining cast iron, brass, bronze, aluminum and non-metallics. These grades of ARMIDE are distinguished by the corresponding color of the cutter-bit shank.

Both ARMIDE (Red) and ARMIDE (Grey) Cutter-Bits come ready-ground in four standard cutter shapes (illustrated below) namely: Right-Hand Turning, Left-Hand Turning, Square

Nose Finishing 80° and Round point "V". Both ARMIDE (Red) and ARMIDE (Grey) cutter-bits come with either "Square" or "Heavy Duty" shanks. The shanks of "Square" cutters have a square cross section. The shanks of "Heavy Duty" cutters are deeper than they are wide in cross section, the added depth compensating for that part of the shank cut away to receive the ARMIDE tip.



Square L.H. R.H.

ARMSTRONG BROS. TOOL CO.

"The Toul Halder People" 360 N. Francisco Ave., Chicago, U.S.A. Eastern Warehouse & Sales: 199 Lafayette St., New York



A Tool Room SURFACE GRINDER That HOLDS Precision Accuracy



BOYAR-SCHULTZ No. 618 SURFACE GRINDER

DESIGNED to meet the demand for precision in the most exacting tool and die work, and gage grinding, this Boyar-Schultz Surface Grinder is engineered to maintain that high degree of accuracy through long continuous operation.

Spindle is specially designed, dynamically balanced and equipped with super-precision, pre-loaded ball bearings; operates smoothly and quietly at 3,000 R. P. M.

Table of close grained Mechanite moves longitudinally only, and on hardened and ground tool steel ways — one V and one flat. New improved cross feed is designed to move the abrasive across the work in a true horizontal plane assuring maximum accuracy.

Write for circular describing this smooth running, easy handling machine tool.

BOYAR - SCHULTZ CORPORATION 2116 WALNUT STREET

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TRY THESE FOR YOUR DRILLING 'HEADACHES'

The Cogsdill "MERCURY" twist drill is specifically designed for production drilling - it is heavier webbed - with faster spiral, and deeper relief to withstand abuse and drill deep holes without excessive clogging.



COGSDILL TWIST DRILL COMPANY

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A. S. T. E. DOINGS

National A. S. T. E. Headquarters: 1666 Penobscot Bldg., Detroit 26, Mich. Telephone CHerry 8082. National Officers: (1944-45 term): President, D. D. Burnside: 1st Vice-President, C. V. Briner; 2nd Vice-President, A. M. Sargent; 3rd Vice-President, W. B. Peirce; Secretary, E. V. Johnson; Treasurer, F. W. Ealon; Assistant Secretary-Treasurer, L. G. Singer; Executive Secretary, A. L. Poller.

For application blanks and information pertaining to membership in the American Society of Tool Engineers, address the Secretary's office, 1666 Penobscot Bldg., Detroit 26, Mich.
Senior initiation fee is five dollars. Dues eight dollars per year for senior grade membership and five dollars per year for junior grade membership. Junior initiation fee is two dollars.

- Tri-Cities- Ladies' Night speaker at the December 13 meeting was Mrs. John Clayton of Chicago, a native of Estonia. She spoke on, "I Saw Head-lines Happen."
- Toronto-Chapter members attended a Stag Party December 1.
- · Syracuse-Allen Wurburg, National Broach and Machine Company, spoke at the December 12 session on "Broaches and Broaching ·Practices"
- •St. Louis-E. H. Nieman, Carburetor Corporation, spoke on "Motion-Time Applied to Tooling" at December 7 meeting. Annual Christmas party was staged December 22 at Norwood Hills Country Club.
- •San Diego—Chapter 44 met in joint session with American Society for Metals December 8 for a panel dis-cussion on magnesium. Two films supplemented the speaking program.
- Montreal—A. A. Cambria, LaPointe Machine Tool Company, spoke at the December 13 meeting on "History, Value and Technique of Broaching".
- Los Angeles—Leslie Larrieu, Morris P. Kirk & Son, Inc., spoke on "Development and History of Kirksite" at the December 14 meeting.
- New York-C. R. Maxon, New Jer-

sey Zinc Company, spoke on "Zinc Alloy Casting" at the December 4 session.

- South Bend-G. E. Platzer, Chrys-ler Corporation spoke on "Making ler Corporation, spoke on "Makin Machine Parts From Metal Powder at the November 14 meeting.
- · Worcester-The December 5 meeting was given over to fellowship.
- · Lakehead-Three addresses featured the December 7 meeting. W. O. Will, O. J. Weiben, R. B. Douglas, all from Canadian Car & Foundry Company, Ltd., shared the speaking schedule.
- Indianapolis— Ladies were guests at the December 9 session. Speaker was Dr. Hilton Ira Jones, Hizone Research Laboratories.
- Rochester-C. F. Landshaft, Boonton Molding Company, and E. M. Wolcott, Formica Company, offered interesting discourses on plastics at the December 12 meeting.
- · Schenectady-"Broaching" was subject for a speech by A. Forberg, National Broach & Machine Company, at the December 14 meeting.
- · Windsor-A. A. Cambria, LaPointe Machine Tool Company, spoke of "History, Value and Technique of Broaching" at the December 13 meeting.

- •Twin States—C. V. Briner, ASTE National First Vice President, spoke of "A. S. T. E., Its Aims and Objectives" at the December 13 meeting,
- Dallas—Dr. H. B. Osborn, Jr. Tocco Division, Ohio Crankshaft Company, spoke on "Induction Heating—At War Today—At Peace Tomorrow", at the December 8 session.
- Fort Wayne—Marvin E. Mundell, Assistant Professor of Industrial En-gineering, Purdue University dis-cussed "Motion and Time Study"; and R. K. Warren, Plant Metallurgist. Sanderson Works, Crucible Steel Company of America, spoke on the "Latest Developments and Evolution of Modern High Speed Steel" at the December 13 meeting.
- · Philadelphia -- Major E. W. Lafferty. Chief of Production Engineering Division, Philadelphia Ordnance District was coffee speaker at Chapter 15's annual Christmas party December 21.
- Toledo- Meeting December members heard Carey Mann, Westinghouse Consulting Application Engineer, discuss "Electronic Adjustable Speed Drives"
- Providence-Little Rhody members gathered December 20 for their Annual Christmas Party. The program included dinner and entertainment.
- · Boston-"The Hone Abrading Process in Modern Mass Production" was discussed at the December 14 meeting by John W. Kinsey, Field Engineer, Micromatic Hone Corporation. A program feature was the Micromatic movie, "The Hone Abrading Process."
- · Detroit-Dinner, prizes and entertainment highlighted Chapter Number One's Annual Christmas Party December 14.
- New Haven-Leslie F. Airth, Manager, DoAll Hartford Company, spoke on "Precision Measurements in Industry" at the December 13 meeting.
- Wichita—Otis White discussed the use of polarized light in examination of photoelastic substances under stress at the December 12 meeting. White is a chapter member.
- Houston— Houston Chapter met with American Society for Metals to hear Dr. H. B. Osborn, Jr., discuss in-duction heating. Dr. Osborn is with Ohio Crankshaft Company.
- Hamilton A. J. Langhammer, Chrysler Corporation, spoke on powmetallurgy at the December 8 meeting.

(Continued on page 202)

NATIONAL OFFICERS GUESTS OF POTOMAC CHAPTER



Potomac Chapter was host to National President D. D. Burnside and C. V. Briner, First Vice President, at Executive's Night December 7. Principal speaker was Hiland G. Batcheller, Chief of Operations, War Production Board, Washington.



JANUARY, 1945

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- Hartford—John W. Kinsey, Micromatic Hone Company, was speaker at the December 4 meeting. His subject was "The Hone Abrading Process in Modern Mass Production".
- Fond Du Lac Theo. J. Jenson, School Superintendent, was speaker at Ladies Night. He spoke on "Victory Through Education",
- Springfield (Mass.) Technical speaker at the December 11 meeting was Major N. B. Ellison of Springfield Armory. Lt. Col. A. K. Stiles gave the coffee speech.
- Cleveland—Duke L. Sass, Atlas Hard Chrome Service, and B. A. Shwartz, Jr., General Hard Chrome Company, spoke on "Hard Chrome Plating" at the December 8 meeting. Second subject, "Metallic Spraying", was covered by R. A. Wiese, Neo Mold Company.
- •St. Catherines— Niagara District heard J. A. D. McCurdy speak on "Canada—Cradle of Empire Aviation" at the December 13 meeting.
- Erie—Stabilization of steel at subzero temperatures was discussed at the November 7 meeting by F. W. Whitcomb, Motor Products Corporation.
- Richmond—Speaker at the December 12 meeting was C. James Proud, Aero Products Division, General Motors, on the subject, "Working on Air".

- York—J. H. Quick, Radio Corporation of America, spoke on "Tool Designing for Production with Motion and Sound Pictures". The meeting was held December 12.
- Cincinnati—Major Raymond S. Fanning, Combat Intelligence Officer, spoke on "Current Aspects of World War II" at the December 12 meeting.
- Kansas City—Addressing the December 6 meeting, J. F. Stephens, Vice President, Gustin-Bacon Manufacturing Company, spoke on "Midwest Research Institute." Jack Kock, Carpenter Steel Company, talked on "Design for Heat Treating".
- Elmira—Francis M. Shull, Optical Engineer, Eastman Kodak Company, speaking at the December 4 meeting repeated his 1944 ASTE National Semi-Annual Meeting talk on "The Panoramic Sight".
- Fairfield County—Speaker at the December 6 meeting was J. W. Kinsey, Micromatic Hone Corporation. Subject of his talk was the "Hone Abrading Process."

Coming Meetings

Springfield — January 8, Highland Hotel. B. L. Levison, B. F. Hirsh, Incorporated, will speak on precision castings.

Schenectady—January 8, Elks' Club. Ladies night entertainment includes dinner, entertainment and dancing

Fort Wayne—January 10, Chamber of Commerce Building.

Elmira—January 8, Mark Twain Hotel. Induction heating will be discussed by Dr. H. B. Osborn, Jr., Tocco Divison, Ohio Crankshaft Company; and E. Miotel, Gorton Machine Company, will present the movie, "An Exact Duplicate".

Richmond—January 9, Richmond Leland Hotel. Speaker will be A. Gabriel. Vice President, Acme Industrial Company.

Racine—January 8, Manufacturers Association of Racine. "Recent Developments in Balancing Machines" will be discussed by Warner I. Senger, Manager of Balancing Machines Division, Gisholt Machine Company.

Fond Du Lac—January 12, Hotel Retlaw. "The Shape of Things to Come", a new movie, will be presented by The Boontoon Molding Company.

Hamilton—January 12, Kirby House, Brantford, Ontario. H. Gotberg, Colonial Broach Company, will speak on modern broaching methods.

Toledo—January 10, Toledo Yacht Club. A. A. Cambria, Chief Engineer, LaPointe Machine and Tool Company, will talk on "Broaching". THE END

ANNOUNCING New 5" Diameter Magni-Ray

Here is the new, illuminated magnifier in the size you've been demanding. The FIVE INCH lens enables you to inspect a wide field with clear, undistorted vision, Price \$29.70 complete with stand.

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"PRECISE PRODUCTION" is published periodically by the GEORGE SCHERR CO, in the interest of greater precision. Write us on your business lotterhead and we'll send it to you regularly.

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rawhide — tough, resilient, long-lasting C/R mechanical rawhide. They strike effective blows without battering or marring . . . without fatiguing re-coil. They hold their true striking surfaces. Sizes and weights for every need. Hammers are malleable iron with replaceable C/R Rawhide insert faces.

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JANUARY, 1945

GROUND TAPS, THREAD GAGES, THREAD HOBS & SPECIAL THREADING TOOLS, SPECIAL TAPPING MACHINES

203

Features of New Drill Pit Aid Production

• WARREN, OHIO— An unusual radial drill pit, designed to handle complicated and cumbersome materials with ease, is an outstanding feature of the Warren City Manufacturing Company plant here. The \$9,000,000 plant, in which the pit is located, currently is producing LCM-3 Navy invasion landing craft and other war materiel.

Centrally located in the machine shop bay of the quarter-mile-long plant, a well-planned arrangement of seven radial drills facilitates drilling operations and shows substantial results in economy.

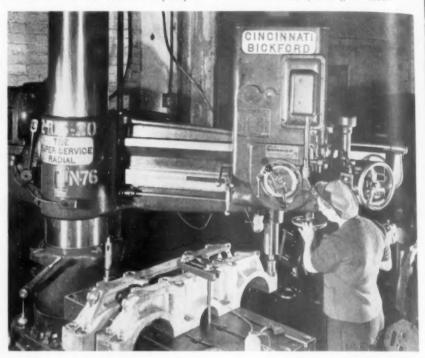
The pit itself is 16.2' long, 9' 7" wide, and 4' 3" deep. Each Cincinnati Bickford drill is mounted on a travel base, eliminating many crane moves of the work itself. Four of the drills have a vertical travel of 8' 11 34", two extend 10' 5 ¼", and one equipped with an extension has a vertical travel of 12' 6", permitting drilling work of exceptionally large size. Filler blocks are utilized for smaller work and angle setups.

Because of the unusual pit arrange-

Right: Warren City Manufacturing Company's drill pit handles small work through use of filler blocks. Bearings are for a destroyer drive. ments, women employees can conveniently operate the drills on work of any size.

Cutting compound is fed to each drill press from a trough running level with the bases. After use, the compound flows along the grooved and sloped pit bottom to one end where it is pumped up again for re-use. Chips disp sal is handled by magnet or tongs.

Warren City Manufacturing Company is engaged in machining and fall-ricating a wide variety of heavy quipment. Work machined in the fit includes cargo drives, Diesel cran cases, condenser shells, and gear cases







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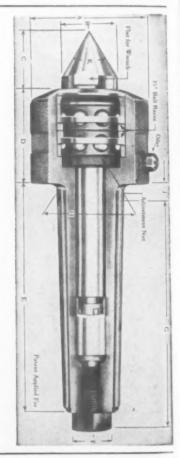
Have adjustment to take up wear and preload bearings

Standard Morse Taper No. 2 to 6 in stock

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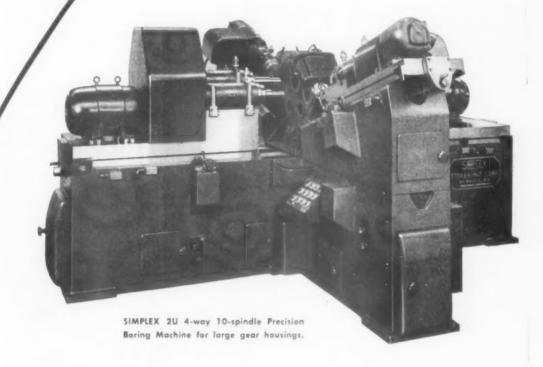


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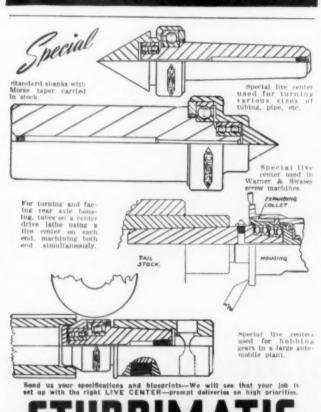
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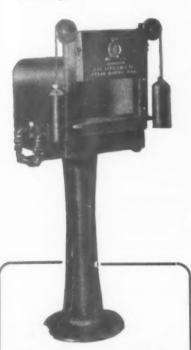
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For quick, accurate heat-treating of high-speed steels. Counterbalanced door opens upwards so tools may be easily inserted or withdrawn without fully opening door. Firebox 73/4" high x 13" wide x 161/2" long heavily lined with high temperature insulating refractory. 4-Burner Unit shown for temperatures 1400 to 2000°F. 6-Burner Unit for temperatures 1800 to 2400°F. Complete with Carbofrax hearth, G.E. Motor and Johnson Blower.

4-BURNER UNIT \$295 6-BURNER UNIT \$325

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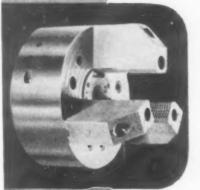
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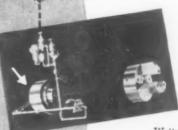
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"Airgrip's" Two-Fisted action provides double gripping-power... Air PLUS a cam-wedge action which operates in both directions. Locks jaws mechanically when gripping either externally or internally. Even if air supply is cut off, double locking power holds work securely, prevents spoilage and delays.



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REDUCERS include Air Operated Collets, Arbors, Mandrels, Drill Press Chucks, Finger and Compensating Chucks (2- and 3-jaw), Valves, Lubricating Assemblies, Revolving and Stationary Air Cylinders, Foot Valves, etc. Also Hydraulic Pressure Units and Fittings.

Write mentioning products on which you desire Bulletins,

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Here's an internal-gear rotary pump with a built-in automatic by-pass that allows small chips and grit to pass through without serious injury to working parts. Precision-built, this Tuthill Model M pump provides long, uninterrupted service. Sizes from 1 to 50 g.p.m. Available in stripped form for direct incorporation into the design of the machine. Write for complete catalog.

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ORIGINATORS AND
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First Aid FOR MISALIGNMENT TROUBLES

When tapping and reaming jobs come through with holes oversize or bell-mouthed, what you need is a Ziegler Floating Holder—first aid for misalignment troubles.

Even though the spindle may be out of alignment with the work as much as 1/32" radius or 1/16" diameter, the Ziegler Holder automatically compensates for the inaccuracy, enabling the tool to do a perfect job.

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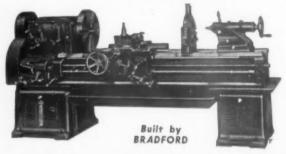
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Bradford's experience in building metal-working machinery covers more than a century.

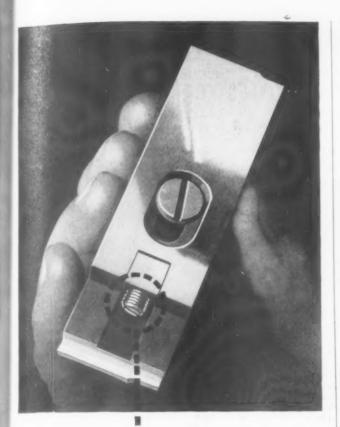
Lathe offers you a combination of outstanding features of construction and design.

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SCREW ADJUSTMENT ...CUTS SET-UP TIME EXTENDS TOOL LIFE

You save vital minutes in reaming operations because of Madison's unique one-screw adjustment. A Madison cutter can be slipped from the Madison bar and reset to any desired dimension with an ordinary screw driver or expanded to make up for wear or regrinding. Reinserted in the bar you can be sure both cutting edges will cut. One screw adjusts both blades, eliminating the possibility of an off-center adjustment. Then, too, Madison cutters are pre-sized and any number may be stored in the crib. This makes it unnecessary to disturb an original set-up when a cutter becomes dull. The dull cutter is merely slipped from the bar and the new or sharpened cutter inserted in its place. One-screw adjustment is exclusive with Madison reaming tools.



Write for the new Madison catalog just off the press. Shows complete lines, prices, and grinding instructions that will save you time and money.

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DE WALT ANSWERS INDUSTRY'S NEED FOR A VERSATILE ALL-PURPOSE CUT-OFF SAW!



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Here's a DeWalt that you can use for many jobs anywhere in your plant now!

DeWalt is the ALL-PURPOSE machine that can be changed quickly, as required, from a straight-line cut-off saw — to miter saw — to rip saw — to dado machine—to shaper—or other operations that can be made with circular cutting tools.

Investigate DeWalt. Install a DeWalt. Reduce cutting costs. Simplify materials handling. Eliminate waste. Save time. DeWalt is available in models ranging from ½ H.P. to 10 H.P. Send coupon below for full information.

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• THE PASSING PARADE

T.M. REG. BY THE BRANSON PUBLISHING COMPANY

THE EVER-CHANGING SCENE IN MASS MANUFACTURING

Company Changes— Carpenter Steel
Company, Reading, Penna., reports
personnel changes, including: John W.
Moxon, Dartmouth College graduate
and student of economics in France, is
now Secretary-Treasurer, succeeding
Joseph S. Pendleton, deceased. Willard E. Roberts has been selected as
Controller. Paul B. Greenawald, longtime Carpenter employee, has been appointed General Superintendent of mill
operations. George V. Luerssen, for
37 years in the Metallurgical Department, has been appointed Assistant
Chief Metallurgist.





G. V. Luerssen

P. B. Greenawald

Operations Head—Myron B. Gordon, formerly Vice President and General Manager, Wright Aeronautical Corporation, has been elected a director of Fairchild Engine & Airplane Corporation and has been made Vice President in Charge of Operations.

Organizes Firm—John C. Cotner, formerly a vice president of Logansport Machine Company, has organized the Cotner Machine Products Company and will handle air-hydraulic devices in Logansport, Indiana.

General Manager—Cooper Alloy Foundry Company, Hillside, N. J., announces appointment of Daniel W. Talbott, formerly with Symington Gould Corporation, as General Manager. Talbott was also connected with Ohio Steel Foundry Company. He is a Carnegie-graduated metallurgist.

Two Promotions—Appointment of T. L. Knecht as Vice President and General Manager of Borg & Beck, Borg-Warner Corporation Division, was closely followed by appointment of J. T. Branit as Factory Manager of the firm's two plants. The two will assist in formulating conversion plans.

New Appointment—A. C. Reppenhagen, formerly General Manager of Experimental Tool and Die Company,

De-Sta-Co

TARRED FOR

has been selected as Secretary of Mid-West Abrasive Company, according to J. T. Jackson, President.





John W. Burke

R. D. Bennett

California Bound—Racy D. Bennett has resigned as Manager, Hydraulic Division, Vinco Corporation. He expects to establish an office as Consuling Engineer near Los Angeles.

Department Manager — Vacancy as Manager of Chevrolet commercial and truck department caused by elevation of W. E. Fish to Assistant General Sales Manager, Chevrolet Division, has been filled by John W. Burke, according to William E. Holler, General Sales Manager.

(Continued on page 212)





Rust prevention made easier and surer with . . .

STANORUST

Most oils or greases will give some measure of rust protection, but a product specifically developed for rust prevention will make

> the job easier, give more reliable, longer-lasting protection, and cost less in the end.

There are 18 grades of Stanorust and "SR" rust preventives - each has specific uses and advantages. Some of them were specifically made to meet U.S. Government specifications. If you have a problem of rust prevention on: stock in storage, parts in production, or complete machines to be shipped or stored, let us help you pick the grade or grades of Stanorust you need-and make a test. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois. Your questions will be

answered or referred to the Lubrication Engineer nearest you for handling.



Gasoline Powers the Attack . . . Don't Waste a Drop!

STANORUST GIVES COMPLETE RUST PROTECTION PLUS THESE ADVANTAGES

- 1. Easy application. Because Stanorust is available in grades for spraying, swabbing, or dipping, and for hot or cold application, you can choose a product that is easiest to apply under your present conditions.
- No waste. The wide choice of grades also makes it possible to apply the exact film needed to give the protection which the job requires.
- Does not crack or peel. Stanorust does not harden or form a paint-like film which will be chipped off or damaged in handling.
- Easily removed. Most grades of Stanorust can be removed by wiping the parts clean with a cloth dampened with petroleum solvent.
- **5.** Acts as a lubricant. It is not necessary to remove Stanorust from parts that are to be assembled in a complete machine. Stanorust, itself, acts as a lubricant.
- 6. Light color.
- 7. Noninjurious to workers.
- 8. No unpleasant odor.

STANDARD OIL COMPANY (INDIANA)



Field Engineer—B. C. Ames Company reports Ralph Woodward has joined its staff as Sales Engineer. The Waltham, Mass., firm has announced that Woodward was formerly associated with Norton Company.

National Honor— New Multiple V-Belt Drive Association President is Walter A. Meyer, Allis-Chalmers Manager of Dealer Sales. He had been Vice President and Executive Committee Chairman of the association. Other officers include William D. Hamerstadt, Indianapolis and A. B. Anderson, Chicago.

New Representative — Norton Company, Worcester, Mass., reports Thomas M. Thornton has been selected as Field Engineer in Detroit; R. C. Willey will be Abrasive Engineer in Pittsburgh and his successor as Office Manager will be Ralph E. Rasmussen; R. H. Langdon will become Abrasive Engineer in a New England territory and E. L. Hurst was named Field Engineer for New York City and northern New Jersey.

President Resigns—Effective January
1, 1945, Edward G. Seubert will resign his post as President of Standard
Oil Company of Indiana. He has been with the company 52 years and chief executive 15. He will remain a director and will be Executive Committee Chairman. Robert E. Wilson, Pan American Petroleum and Transport Company President, will succeed Seu-

bert. A. W. Peake, now a vice president, will be elevated to President. F. O. Prior, now president of Stanolind Oil and Gas Company, will succeed Peake.

Engineer Promoted—L. J. Mueller Furnace Company, Milwaukee, reports appointment of Frank J. Nunlist as Chief Engineer. Frank Schryer, formerly with International Harvester Company, Hamilton, Ontario, has joined Mueller as Plant Superintendent.





Willis Kropp

John A. Krauss

... Krauss has been named President, L. H. Gilmer Company, U. S. Rubber Division. Kropp will do designing for Aircraft Parts Development Corporation, Summit, N. J. . . .

Machine Chief — Zolly Carlton Van Schwartz has been named Chief of Machinery Development in Peck Stow and Wilcox Company's Technical Division. He was formerly Engineering Coordinator for Firestone Aircraft Company and Development Engineer for Firestone Ordnance, Akron.

Manufacturing Chief—Appointment of H. F. Howard as Vice President in charge of manufacturing was announced by Harvey C. Freuhauf, President, Fruehauf Trailer Company, Detroit. Howard has been General Manager of Chevrolet Division factories in Flint.

Research Engineer— John C. Straub has left General Motors for a post as Research Engineer for American Foundry Equipment Company, Mishawaka, Ind. With GM Straub was for 13 years associated with the Research Laboratories Division. He is coauthor with J. O. Almen of many technical papers in the metals field. Gilbert D. Dill has been named to the sales engineering staff.

Chief Engineer— Naming John M.
Miller, Jr. as Chief Engineer is reported by United Cinephone Corporation, Torrington, Conn. He will be in complete charge of the firm's designing and development work. He formerly did radio design and development work with Philco, U. S. Navy and RCA Victor.

Company President — Luscombe Airplane Corporation activities will be directed by Leopold H. P. Klotz, who was named President to succeed A. C. Hastings, Jr., retired. Klotz served as Vice President and Treasurer.

(Continued on page 214)

ULTRA SURFACE FINISHING with ACCURATE SIZING

IMPROVED GRAIN
STRUCTURE—ALL
ASSURING MUCH
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Secured By
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Tools For Straight Holes; Concentric Angles, Flats and Contours

Also Combinations of These In One Tool

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"HOLE" ENGINEERING SERVICE
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GARRISON GEAR CHUCKS

are used on:

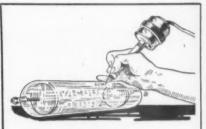
Gear Shapers ... Drill Presses ...
Engine Lathes ... Turret Lathes
... Internal Grinders ... External
Grinders ... Gear Tooth Grinders ...
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PROVIDES an easy, economical, modern way to mark such materials as metal tags, glass, porcelain, plastics, etc. With proper identification you save valuable and often hardto-replace tools or articles.

Not much larger than a pencil, the TOR-NADO Writing Tool operates on the same basic principle of point contacting the object. Easy to use on any of the many part-marking jobs often required to be quickly and neatly done.

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DUAL-SPIRAL REAMER FINISHES MORE HOLES PER MAN-MINUTE

Set of six pictured (No. JR) sizes 1/2", 5/8", 3/4", 7/8", 1", 11/4", range from .475" to 1.295". Set comes complete with pilots in fitted hardwood chest. Righthand flutes on the Lempco Reamer spiral counter to left-hand flutes simultaneously, shearing mirror-smooth finishes in practically any metal or plastic. Alignment reamers made with extensions and follow-pilots of variable lengths. Prompt delivery!

- * 500% Greater Straight Line Expansion Range
- * Eliminates Honing
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- * Hand or Machine Types
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 to 3-3/32"

MAIL PRINTS FOR SPECIAL JOBS

5761 DUNHAM ROAD . BEDFORD, OHIO

JANUARY, 1945

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NEER

Promotion Manager— Howard Linn Edsall has been selected as Advertising and Sales Promotion Manager, Tube & Equipment Department, RCA Victor Division, Radio Corporation of America, Camden, N. J. Edsall was formerly Advertising Manager of Ajax Metal Company and affiliates.

Name President—Davis and Thompson Company, Milwaukee, reports elevation of William H. Weimer from Executive Vice President to President. His service with the company dates to its organization in 1911. He left for a short time to become associated with Globe Union Manuacturing Company and the Avery Tractor Company. G. L. Otto, Chief Engineer for 12 years, becomes Vice President and will direct all engineering and development work.

General Manager—L. H. Skougor has been selected as General Manager of Continental Can Company's production planning, according to announcement of Carle C. Conway, Chairman and President of the Board. Skougor formerly managed the company's plant in Jersey City. J. F. Engenolf, Vice President in charge of manufacturing, reports the following organizational changes: E. B. Dullinger becomes Factory Manager of Continental's newly acquired Clearing-Owens plant in Chicago. K. W. Houck was appointed Industrial Engineer. J. Fedosky, Jr., former Clearing-Owens Factory Manager will become Egenolf's special assistant. R. J. Humes, formerly Act-



... U. S. Rubber Company's J. Paul Carney carefully examines plane steering apparatus after special insulating bath in company factory . . .

ing Plant Manager, has become Factory Manager of the Wheeling, W. Va., plant. J. M. Gibb will resume former duties as Master Mechanic and Assist-

ant Factory Manager at the Oil City, Penna., Plant. Alex Gibbs has been named Warwood, W. Va., Assistant Factory Manager.

Vice President—The appointment of E. Peerce Lake as Vice President and General Manager of the Warren City Manufacturing subsidiary of Graham-Paige Motors Corporation, was announced by Raymond J. Hodgson, President of the auto concern.

A veteran of 18 years with General Motors, Lake was Vice President and General Manager of the Columbia Machinery and Engineering Corporation, Hamilton, Ohio, before joining the Graham-Paige organization. He was given a wartime leave of absence by General Motors to direct the Columbia Corporation in fulfilling Army and Navy contracts for heavy weapons and machinery.

The Graham-Paige subsidiary, located at Warren, Ohio, is engaged in volume production to landing craft, diesel engine parts and other heavy equipment for the Navy.

Promotion—J. R. Weaver, in charge of the United States Naval Ordnance Plant at Centerline, Michigan, for the Westinghouse Electric and Manufacturing Company, operators of the plant, has been named Works Manager of the East Springfield, Massachusetts, plant of the Westinghouse company. Weaver will continue to head the ordnance plant.

(Continued on page 216)

BROACHES — OF SOLID WILLEY'S METAL



Outwear and outperform broaches made of tool steel many times over. These broaches, of solid Tungsten Carbide, can be furnished in diameters of from .250" to 1" and in moderate lengths. Willey's can also furnish flat or form type broaches tipped with Willey's Metal.

One of the exclusive applications of Willey's Metal is in the manufacture of solid Tungsten Carbide broaches, for precision broaching of cast-iron, magnesium alloys aluminum, non-metallics and certain steels.

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WILL HELP YOU DO IT IN 1945

Sustained post-war employment means large volume production of better products at reasonable prices... that's the story.

• Many component parts of your post-war products can be made better, faster, cheaper—with OH-38.

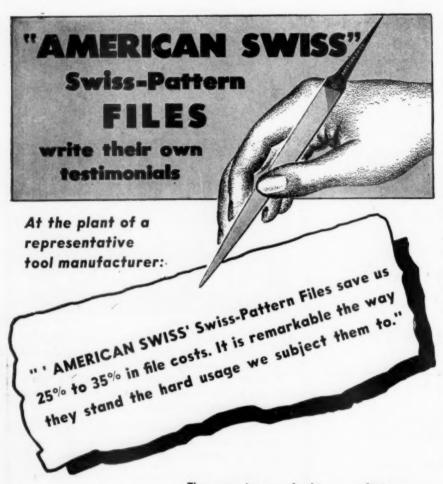
OH-38 Aluminum Alloy—Non-Heat Treated an exclusive product of Hedstrom—is a perfected metal with proven superiority in a wide range of machining operations.

Easily machinable—easy on tools—increases tooling accuracy—holds threads without stripping. Non-corrosive—non-oxidizing—non-magnetic—spark-proof—does not require heat treatment—will not expand or contract. Tensile strength: 35,000 to 40,000 lbs. per square inch. Polishes to silver mirror brilliancy—takes chrome, nickel, or tin plating—may be annodized. Has many other manufacturing advantages.

OH-38 is used only in castings by Hedstrom. Our Pattern Service will supply complete models of parts for your new products. Send for technical information.









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The experience of this manufacturer has been duplicated in plants all over the country, as proven by reports which we have continuously received throughout the 40 years during which we have specialized in the manufacture of Swiss-Pattern files.

"American Swiss" files save filing costs because these precision-made tools have longer filing surface than others, their clean, sharp teeth cut better and faster, and their uniform hardness withstands hard wear and long usage.

For lowest costs and best results in your accurate and intricate filing work, be sure to insist on "American Swiss" Swiss-Pattern files . . . obtainable from our distributor in your territory.

American Swiss File & Tool Co., Elizabeth 1, N. J.

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SWISS PATTERN FILES

—PASSING PARADE— Continued from page 214)

President Retires—S. M. Rust, retiring President of Rust Engineering Company, has been elected Chairman of the Board. He will be succeeded by S. M. Rust, Jr., who has been serving as Executive Vice President. The new president is a Lehigh University graduate.

Society Honor—At their annual 1944 meeting, Engineers Council for Professional Development re-elected Everett S. Lee as Chairman. Lee is in charge of General Electric's General Engineering Laboratory at Schenectady.

Experimental Engineer — J. Ringen Drummond, Experimental Engineer, has been chosen as Assistant Factory Manager, Timken Roller Bearing Company, Canton, Ohio. He succeeds H. M. Rickey who became Factory Manager. Drummond attended California Institute of Technology.

New Headquarters—Jack D. Hughes, formerly Production Manager of Littelfuse Incorporated's Chicago Plant, has been named Eastern Division Sales Manager at the firm's newly created headquarters in New York.

Deaths

Paul M. Downing, 71, Executive Vice President, Pacific Gas and Electric Company, in San Francisco.

George S. Campbell, 56, Production Superintendent, Nineteen Hundred Corporation, St. Joseph, Mich. He had been a company executive 24 years.

Raymond Ellis, 39, Assistant Superintendent of Chrysler Corporation parts plant at Marysville.

Walter Pyrih, formerly employed by OK Tool Company and a member of Fairfield Chapter A. S. T. E. A member of the armed services.

Walter F. Marks, 73, retired Manager of National Lead Company's Milwaukee office.

Edward H. Myers, 67, formerly assistant Superintendent, Cutler-Hammer, Inc., Milwaukee.

George E. Bechtel, 61, Vice President, Trundle Engineering Company, Cleveland.

Dudley H. Miller, President and Director of Speer Carbon Company, Niagara Falls, N. Y.

Alfred S. Gunn, Sr., General Manager, Bethlehem Steel Company, Shipbuilding Division on Pacific Coast.

Carl A. Cover, 51, Manager, Georgia Division, Bell Aircraft Corporation, Buffalo, at Dayton.

(Concluded on page 223)

THE TOOL ENGINEER

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GEARED THINKING

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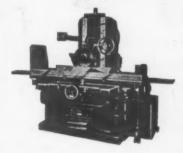
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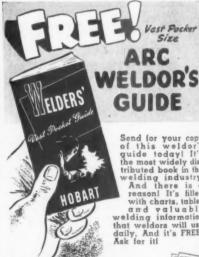


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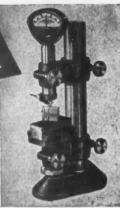


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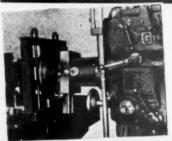
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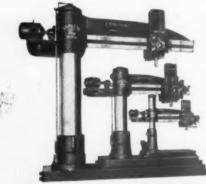
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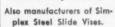
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(Continued on page 224)



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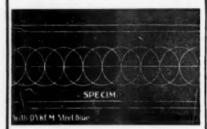
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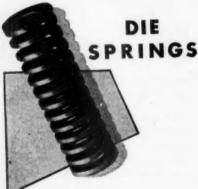
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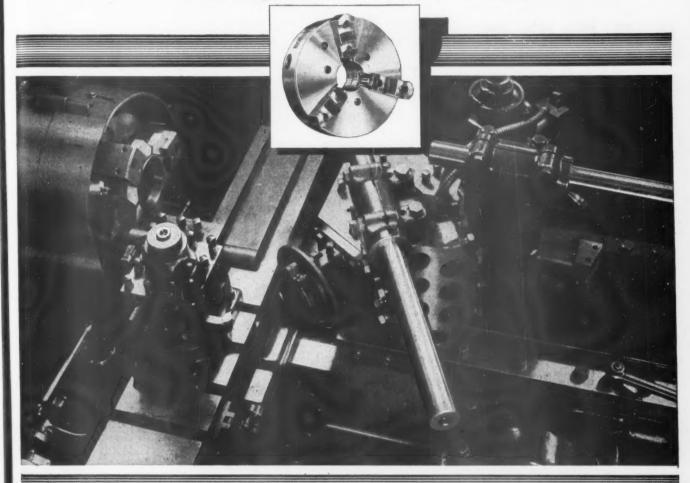
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Ettee Tool Ce	Staples Tool & Engineering Starrett Co., The L. S., Stokerunit Corp. Stuart Oll Co., Ltd., D. A Sturdimatic Tool Co. Surdatrard Machine Tool Sungen Products Co.
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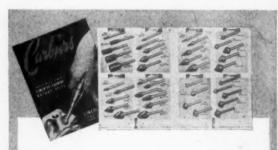
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